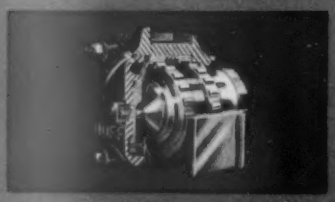
THE
RAILWAY GAZETTE

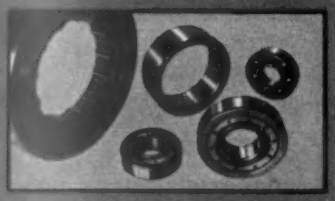
Price: Two Shillings | FRIDAY, AUGUST 18, 1961 | Annually £5 by post

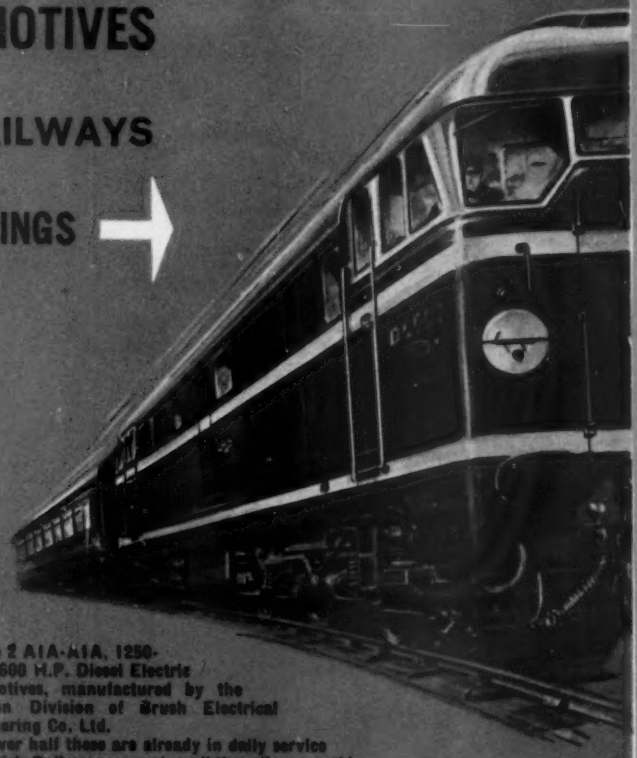
226 BRUSH LOCOMOTIVES

FOR BRITISH RAILWAYS

FITTED WITH HOFFMANN BEARINGS







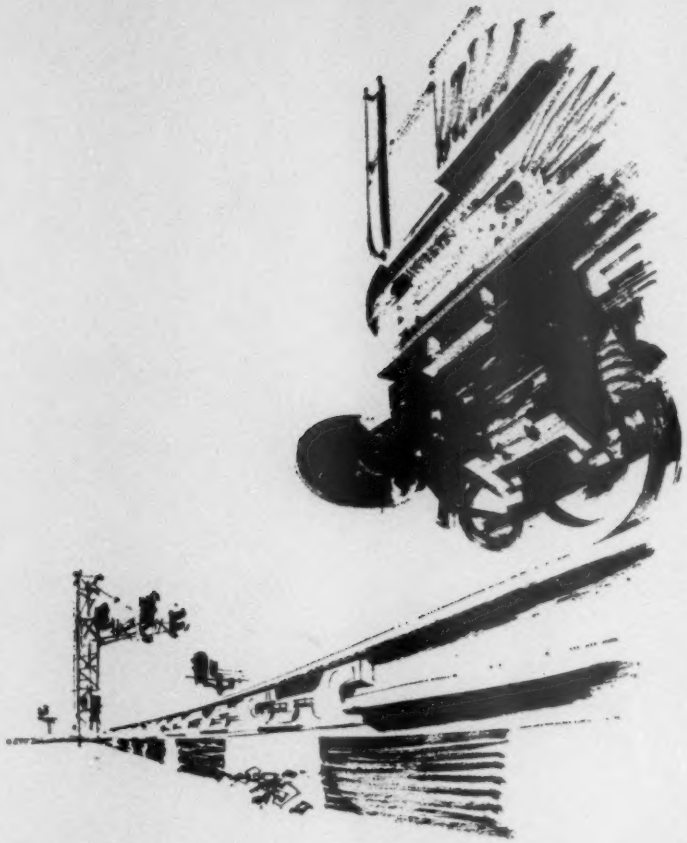
Type 2 AIA-AIA. 1250-1365-1600 H.P. Diesel Electric Locomotives, manufactured by the Traction Division of Brush Electrical Engineering Co. Ltd.
Well over half these are already in daily service on British Railways—running off the miles smoothly, reliably, swiftly on their Hoffmann Bearings.

- Hoffmann Roller Bearing Traction Motor Suspension Units.
- Hoffmann Parallel Roller Bearing Axleboxes.
- Hoffmann Ball and Roller Journal Bearings for main generator and ancillary equipment.

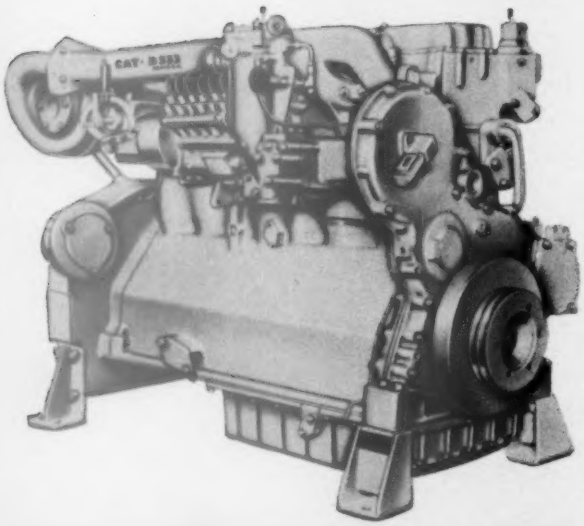
THE HOFFMANN MANUFACTURING CO. LTD., CHELMSFORD, ESSEX.

HOFFMANN

YOU'RE LOOKING FOR POWER?



YOU'RE LOOKING AT CAT POWER!



Nine job-tested models, all heavy duty engines. Compact, economical, lightweight and high in performance. They'll meet your industrial, marine and electric power application needs from 50 to 1,000 H.P.

These engines have abundant ''Certified'' power, eager to handle the tough jobs and ready to go when it comes to vital assignments. You've never known economy and long life if you haven't tried Caterpillar dependable engines.

Caterpillar power comes to you with the major cost-and-time saving advantages of service and complete interchangeability of parts—backed by the finest world-wide dealer organization.

For new equipment or for repowering, order Cat. No other name packs so much power.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

World's Greatest Name in Diesel Power

CATERPILLAR TRACTOR CO LTD GLASGOW · LEICESTER · NEWCASTLE · LONDON TRACTORS · EARTHMOVING EQUIPMENT · ENGINES · PARTS

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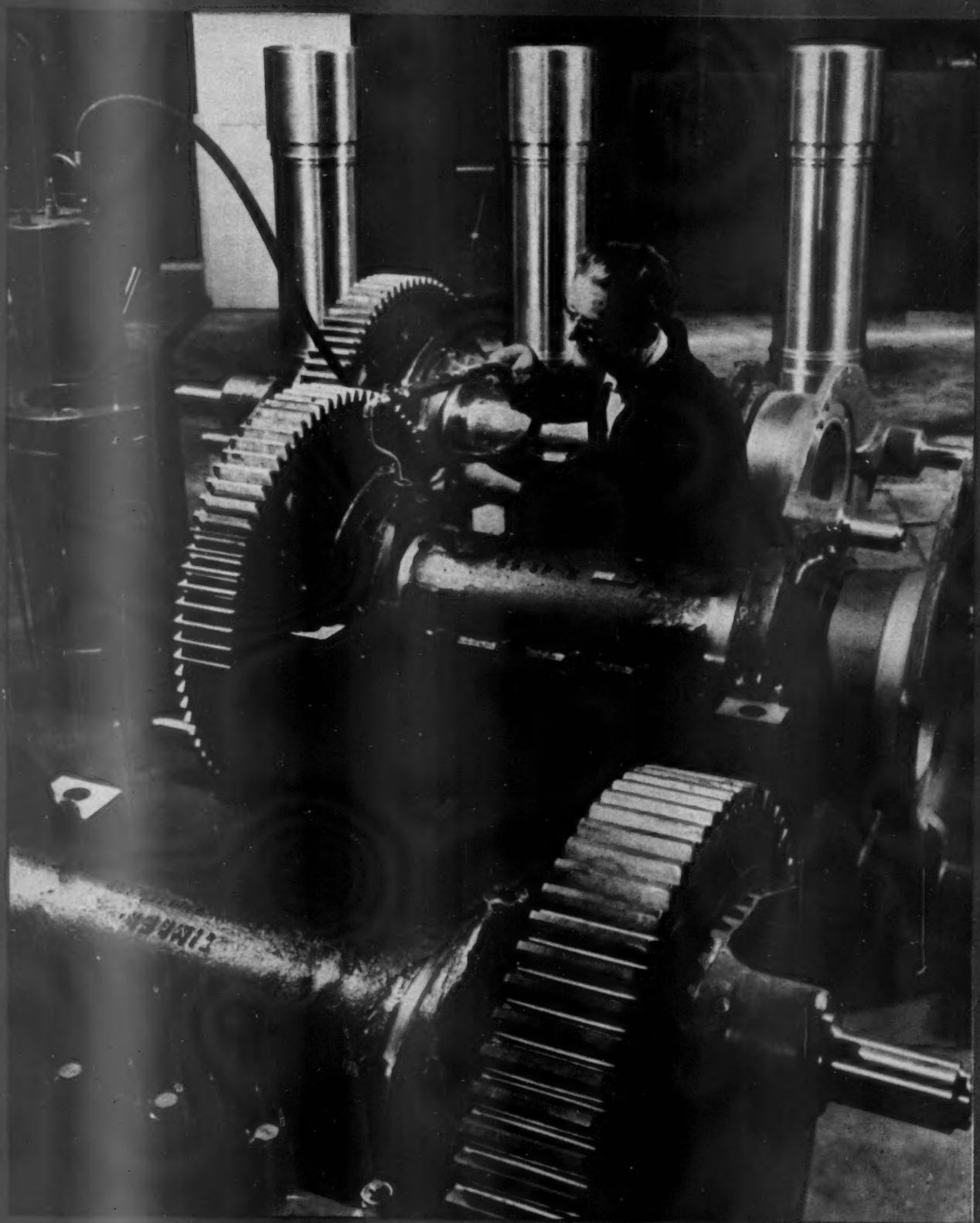


AEI TRACTION GEARS

AEI

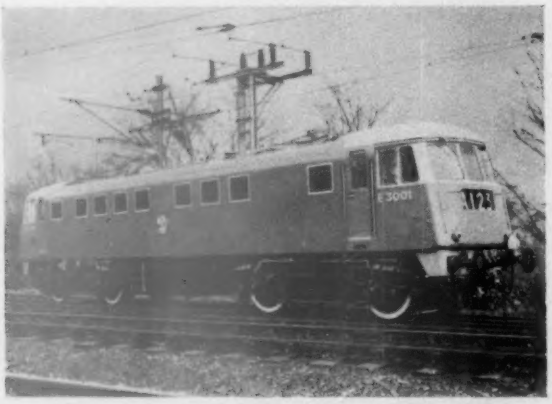
Associated Electrical Industries Ltd.
Traction Division
MANCHESTER AND LONDON

Co-operating in British Railways Modernisation

WESTINGHOUSE

SIGNALS

A new push-button type control desk at Broxbourne on the Bethnal Green–Bishops Stortford line of the Eastern Region.



WESTINGHOUSE

BRAKES

Type 'A' 3,300 h.p. electric locomotive, one of 23 by A.E.I. Ltd., for London Midland Region, fitted with Westinghouse Brake Equipment.

WESTINGHOUSE

RECTIFIERS

A typical Westinghouse silicon traction rectifier. Many such equipments have been supplied for underframe mounting to G.E.C. rolling stock operating on the Liverpool Street/Clacton High Speed Inter-City Service.

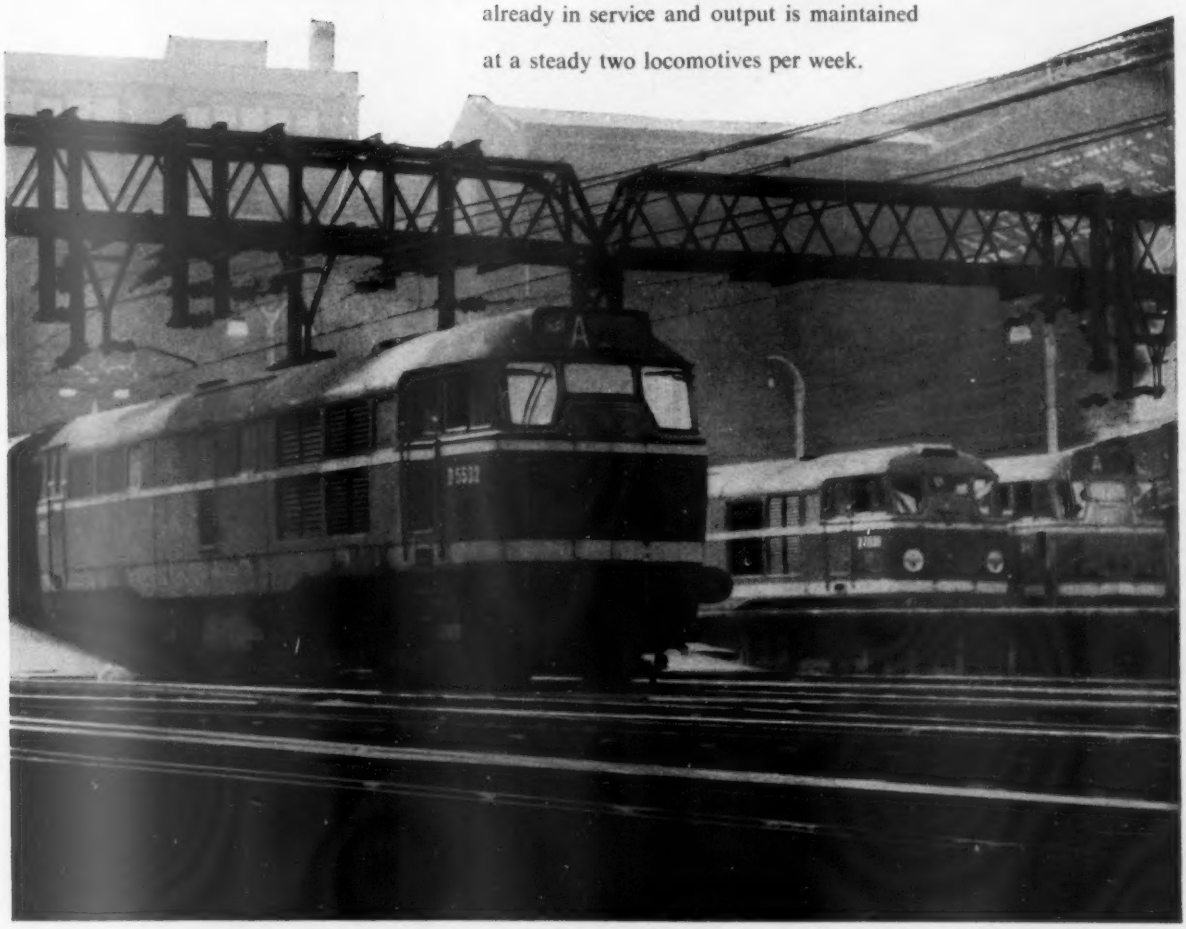
BRITISH DESIGN AND MANUFACTURE

WESTINGHOUSE BRAKE AND SIGNAL CO. LTD., 82 York Way, King's Cross, London, N.1

BRUSH

TWO HUNDRED AND TWENTY SIX LOCOMOTIVES FOR BRITISH RAILWAYS

226 Brush Type-2,1250-1365-1600 H.P. Diesel Electric Locomotives have been ordered for British Railways, over half of these are already in service and output is maintained at a steady two locomotives per week.



BRUSH **TRACTION DIVISION**

BRUSH ELECTRICAL ENGINEERING CO. LTD. LOUGHBOROUGH, ENGLAND *(A Member of the Hawker Siddeley Group)*

A*

'ON-TIME' ARRIVAL

Brush Type II locomotive with Mirrlees JVST engine draws into No. 6 Platform at King's Cross with the empty stock to form the 5.10 p.m. for Royston...

...The London Commuter knows when he's on to a good thing but as he sits back little thought is spared for the Mirrlees diesel which gets him in on-time. Now, in many parts of British Railways, Eastern Region the story is the same—punctuality and reliability—thanks to Mirrlees diesels.

Mirrlees **diesels provide the power**

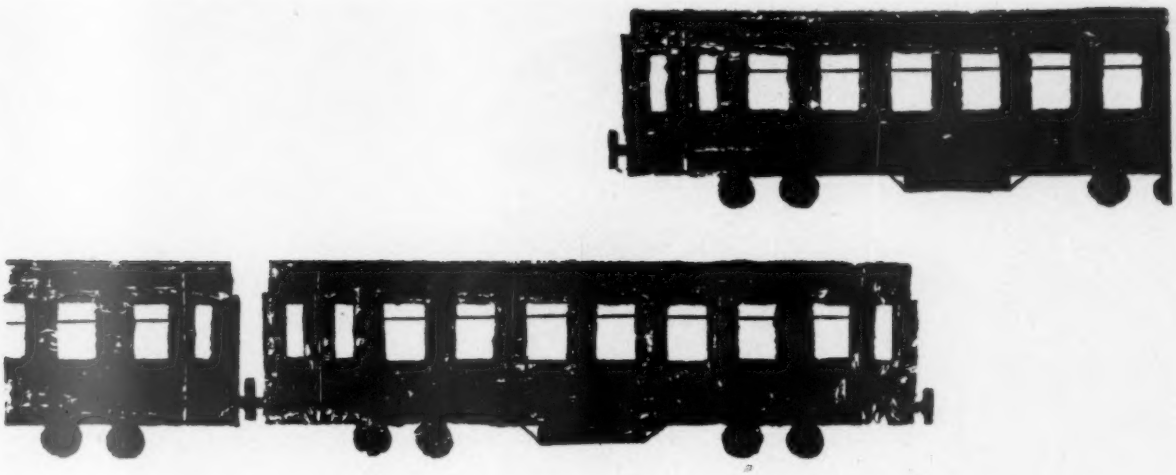
MIRRLEES, BICKERTON & DAY LIMITED

HAZEL GROVE · STOCKPORT · CHESHIRE

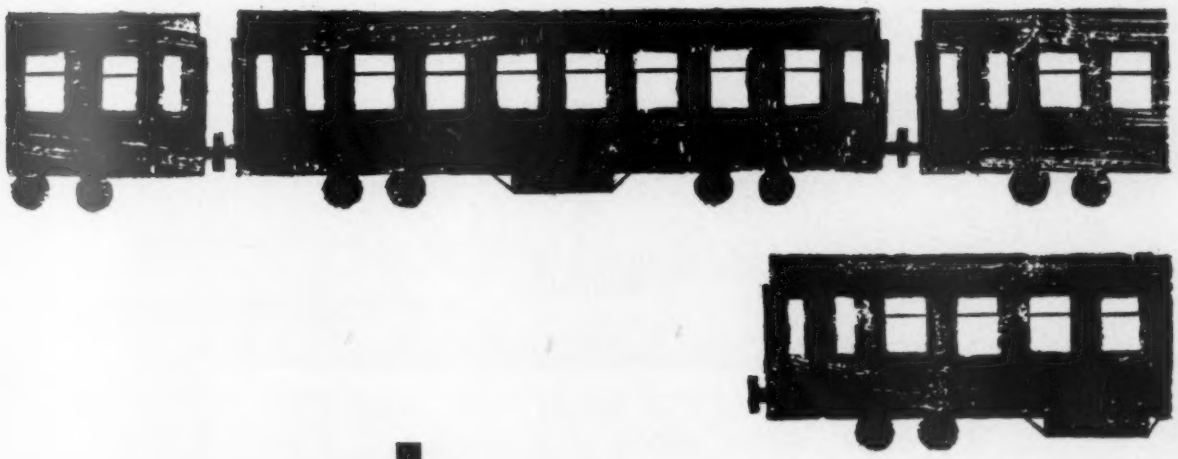
Tel.: Stepping Hill 1000 (15 lines) *Grams.:* "Mirrlees, Telex, Manchester"

A member of the Hawker Siddeley Group

RTE 10



SIGNAL SUCCESS Aluminium in rail transport lessens deadweight and adds payload. It means less maintenance, greater flexibility in structural methods. Imperial Aluminium Company knows all about this. **IMPALCO** aluminium is being used in a very big way for London Transport District Line and Piccadilly Line rolling stock, for British Railways diesel-car units, diesel-electric and diesel-hydraulic locomotives. Strong enough for structural members, light enough for body panelling, durable and versatile, **IMPALCO** aluminium epitomises the transport trends of tomorrow.



impalco aluminium

Imperial Aluminium Company Limited · Birmingham

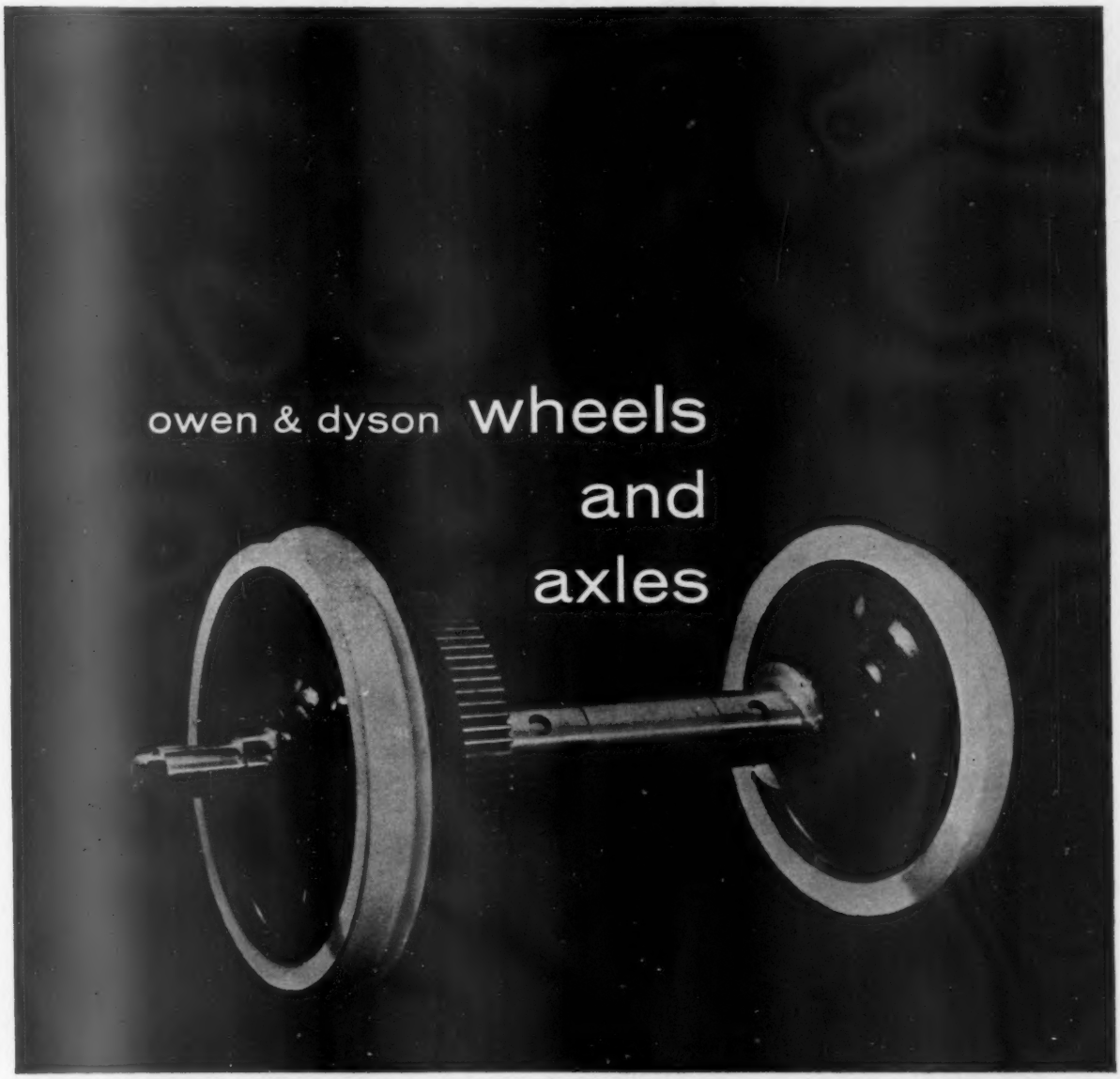
METRO-CAMMELL

BUILDERS OF WAGONS FOR PAKISTAN RAILWAYS

One of 1,365 C.R. Type Covered Wagons supplied to the Pakistan Western Railway. Since the completion of this contract two further orders have been received from the Pakistan Eastern Railway for a total of 2,000 M.C.J. Type Covered Wagons for the Jute Traffic.

METROPOLITAN-CAMMELL CARRIAGE & WAGON CO. LTD.

HEAD OFFICE SALTLEY · BIRMINGHAM 8 | LONDON OFFICE VICKERS HOUSE · BROADWAY · WESTMINSTER S.W.1.



Wheel and axle sets for electric and diesel electric locomotives, carriages and wagons are produced to the high standards of finish and accuracy associated for more than half a century with the name Owen & Dyson Limited.

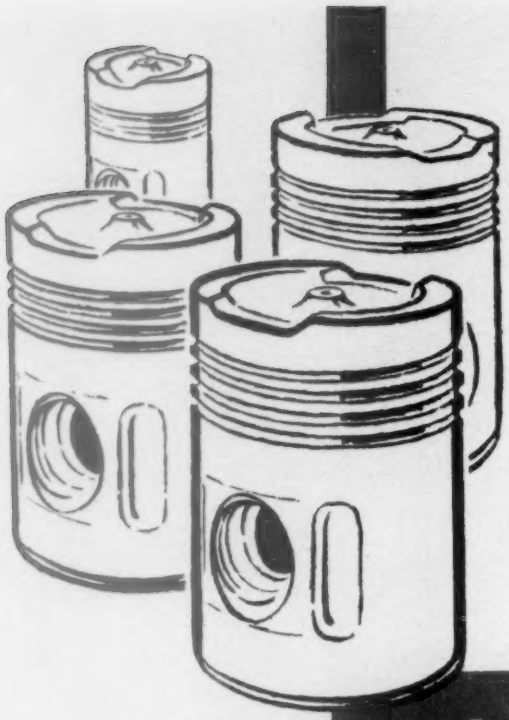
Owen & Dyson Limited machine and assemble components manufactured by their associated company, Steel, Peech & Tozer. They have the advantages of testing equipment including that for checking dynamic balance and for examining the effects of severe or prolonged braking.

OWEN & DYSON LIMITED

ROTHER IRON WORKS, ROTHERHAM, YORKSHIRE Tel: Rotherham 4224. Grams: Press Rotherham.

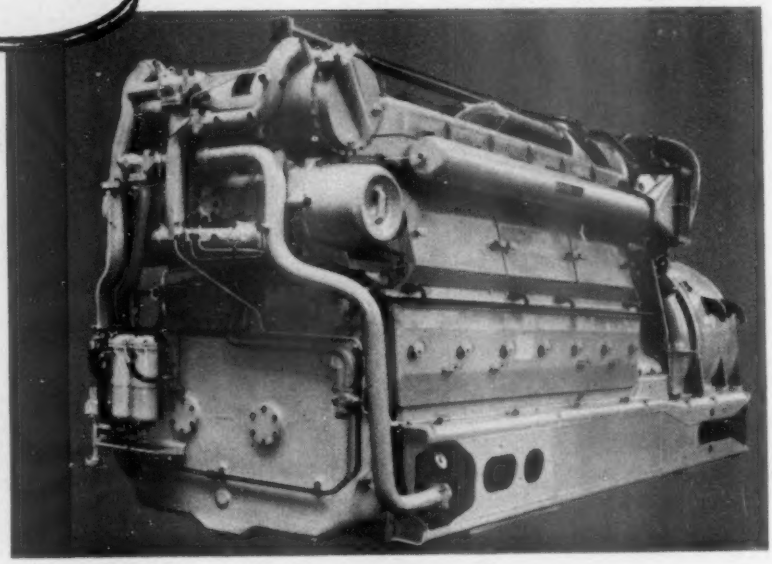
THE UNITED STEEL COMPANIES LTD

ODJ



Duralumin pistons make engines light hearted

Sulzer 12LDA28—B engine—2,500 h.p.



Vickers-Armstrongs (Engineers) Ltd are using Duralumin 'J' to make the pistons for the Sulzer engines which are being incorporated in the new diesels on British Railways. Vickers chose 'Duralumin' because it combines high strength with light weight. These pistons are being produced in the James Booth Forging Department which houses the 12,000-ton forging press capable of producing large forgings up to a weight of 3 tons.

Consider the use of light alloy forgings in your business—you will find the James Booth service refreshingly helpful.

DURALUMIN

REGD. TRADE MARK

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EXTRUSIONS · LARGE FORGINGS · PLATE · SHEET · STRIP AND TUBES IN INFINITE VARIETY

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POWER TO STOP!

MOST Railway Rolling Stock, at home and overseas, relies on

VACUUM BRAKES

THE VACUUM BRAKE CO. LTD.

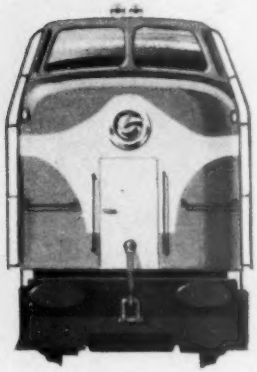
VICTORIA WORKS,

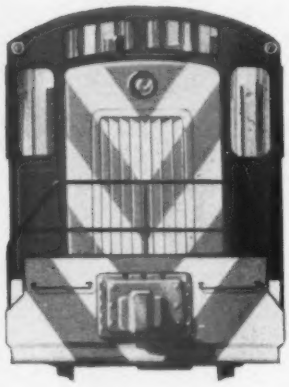
MILLHOUSES, SHEFFIELD 8

Member of the Birfield Group

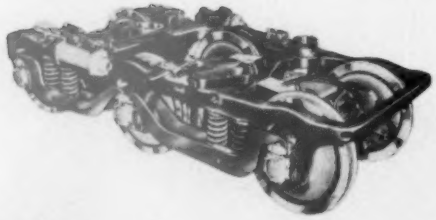
B

FREIGHT, PASSENGER, SHUNTING DIESEL LOCOMOTIVES





all ride on COMMONWEALTH BOGIES



A wide variety of designs meet a wide variety of operating conditions and make General Steel the world's leading designer of diesel locomotive bogies.

All Commonwealth bogies designed by General Steel include sturdy one-piece cast steel frames to assure you of maximum service and safety with minimum maintenance.

Let General Steel apply their years of design, production and service experience to help you.

. . . where railway progress is cast in steel

Commonwealth products are furnished completely machined and are designed for all track gauges by

GENERAL STEEL INDUSTRIES, INC.

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Subsidiary: St. Louis Car Company, St. Louis, Mo.

Commonwealth Products are produced under license in Australia, Canada, England and South Africa

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International Representatives: Granite City, Illinois, U. S. A., *Telegraph:* "Comsteelco"

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FOR BRITISH INDUSTRY
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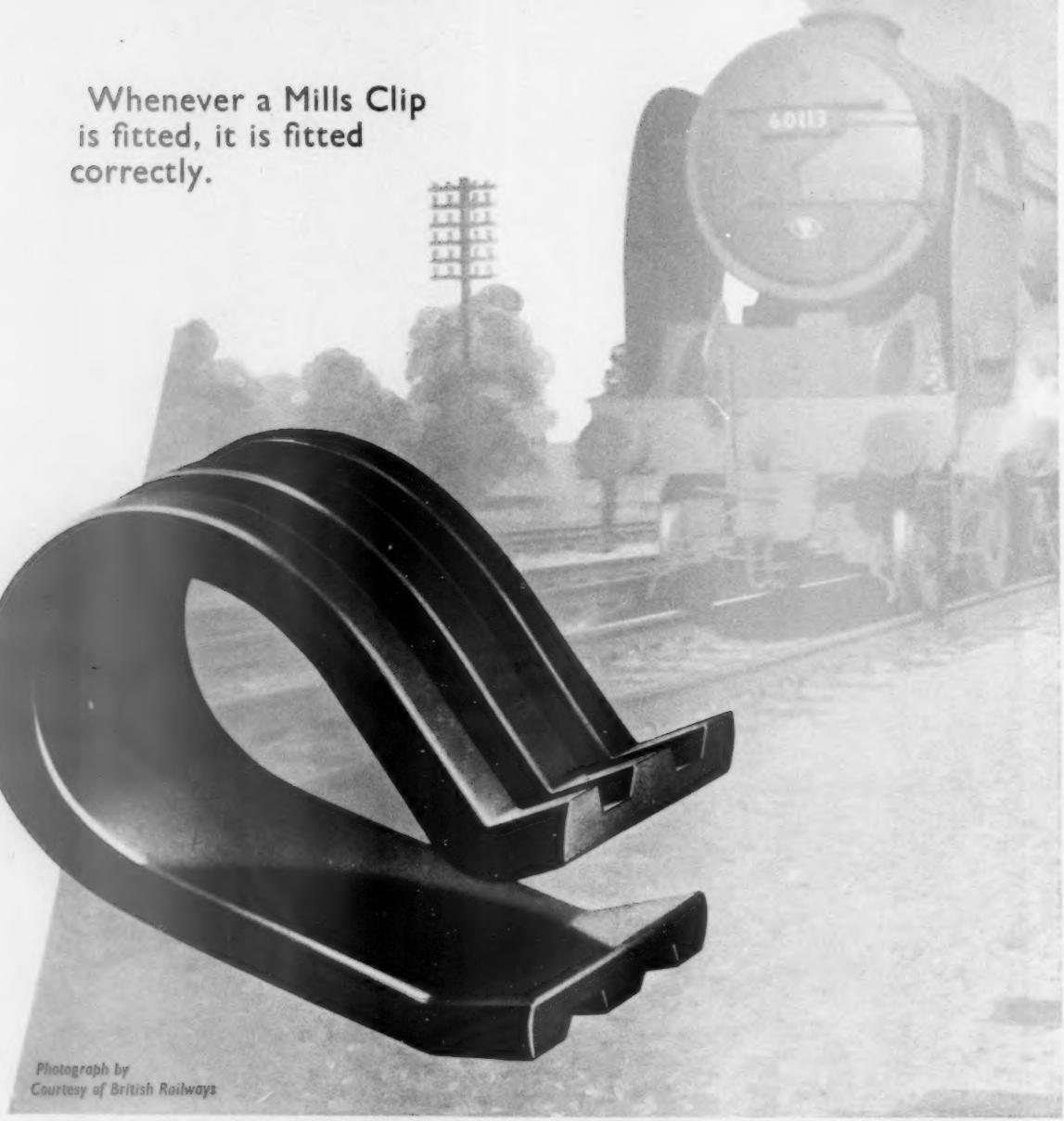
ting
British Oxygen is constantly developing better tools for Industry. Whatever your cutting needs, we have a blowpipe or machine ready to do the job quickly and at low cost. Ask any of our 38 branch offices for experienced and expert advice.
The British Oxygen Company Ltd
LIGHT INDUSTRIAL DEPARTMENT · SPENCER HOUSE · 27 ST. JAMES'S PLACE · LONDON S.W.1
BOC

THE MILLS RAIL
PATENT
AND BASEPLATE

Whenever a Mills Clip is fitted, it is fitted correctly.



Photograph by Courtesy of British Railways

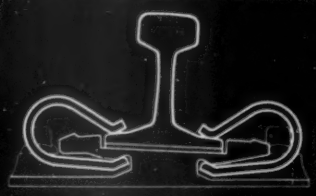
A MEMBER OF THE GKN GROUP OF COMPANIES

EXORS OF JAMES MILLS LTD

BREDBURY STEEL WORKS

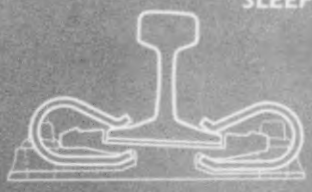
CLIP

FOR WOOD SLEEPERS



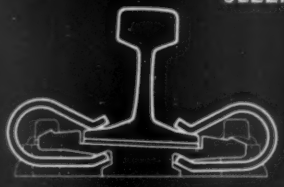
Four-hole baseplate with or without rubber rail pad.

FOR 'E' TYPE CONCRETE SLEEPERS



Two-hole baseplate, interchangeable with CSI Bullhead Chair.

FOR 'F' TYPE CONCRETE SLEEPERS



Small Area two-hole baseplate for main line use.

Every Mills Clip fitted applies a uniform load to the rail within a known range.

Very suitable for long welded rails and all heavy duty track

WOODLEY · NEAR STOCKPORT

Telephone: WOOdley 2231 (7 lines) 3431 (7 lines) Cables: Mills Woodley

There are still

a few forms of transport

in which

BROWN BAYLEY STEELS

do not play

an important part

BROWN BAYLEY STEELS LIMITED · SHEFFIELD

BROWN BAYLEYS

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ANY PLACE

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There is no product we cannot convey. KING'S have specialist groups to deal with small, medium, and large installations for *any*-sized product.

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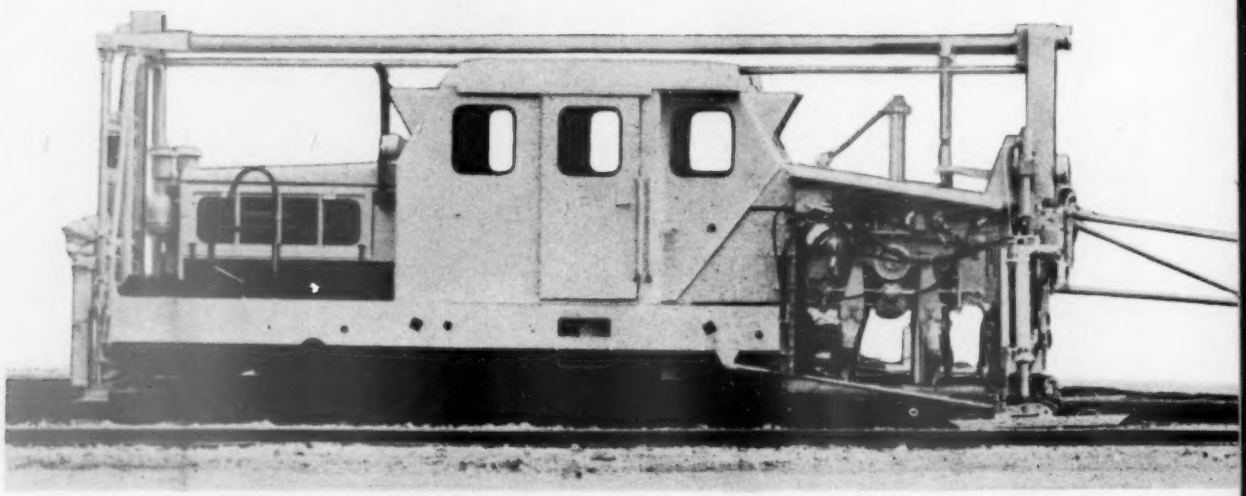
B.60 LEVEL-TAMPER

PERFECT LEVELLING
BY ONE MAN
AT NORMAL RATE OF TAMPING

PRECISION	± 1 mm. in both longitudinal and transverse profiles
SPEED	Simultaneous levelling and tamping
ECONOMY	One man replaces the normal levelling and jacking gang

65 Matisa B.60 Level-Tampers sold in less than a year



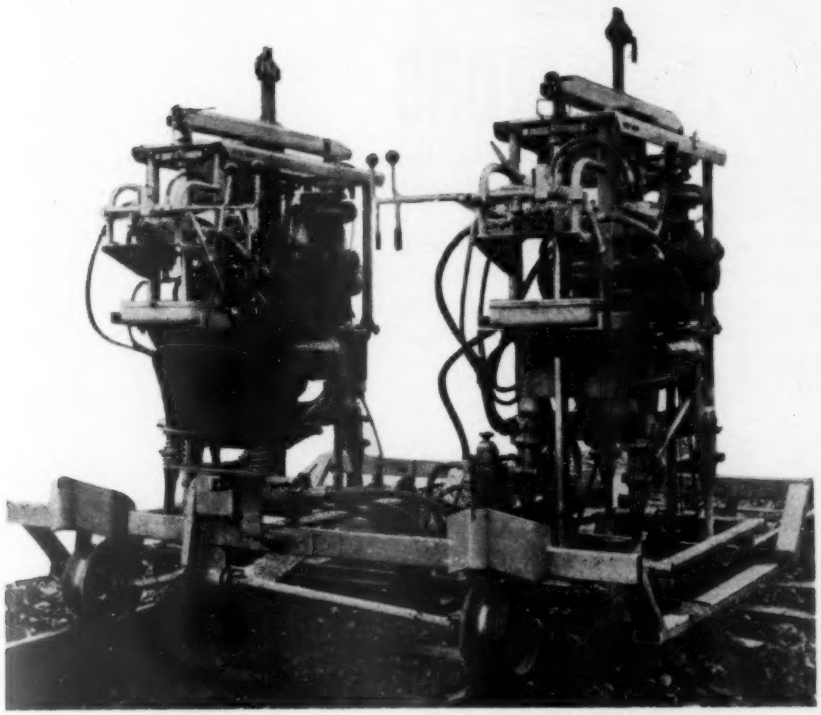
The only Level-Tamper in the world capable of large precise lifts

MATISA EQUIPMENT LIMITED · HANWORTH LANE · CHERTSEY · SURREY

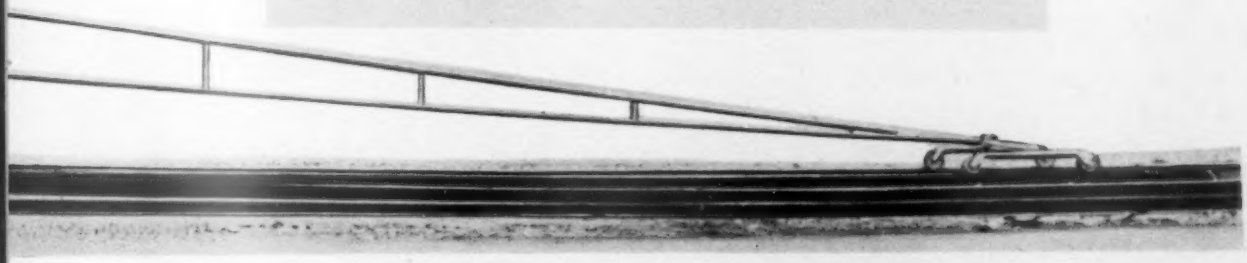
Cables · MATISA · CHERTSEY

MATISA

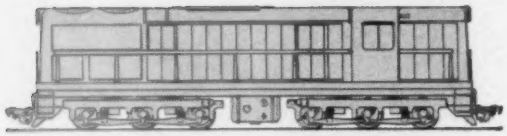
MOTORISED LIGHT TAMPER AN UNPRECEDENTED SUCCESS



More than 600 machines sold—
200 of these in the last 6 months



Associated Companies and Agents throughout the world.



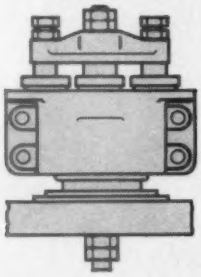
GOING PLACES WITH

BTR

VIBRO-INSULATORS

Going places in East Africa is the A.E.I./Lister Blackstone 'Explorer', fitted—in common with so much of today's rolling stock—with BTR Vibro-Insulators.

Designed to utilize the greatly superior vibration absorption qualities of rubber-in-shear as opposed to rubber-under-compression, Vibro-Insulators are playing an ever-increasing part in railway modernization.



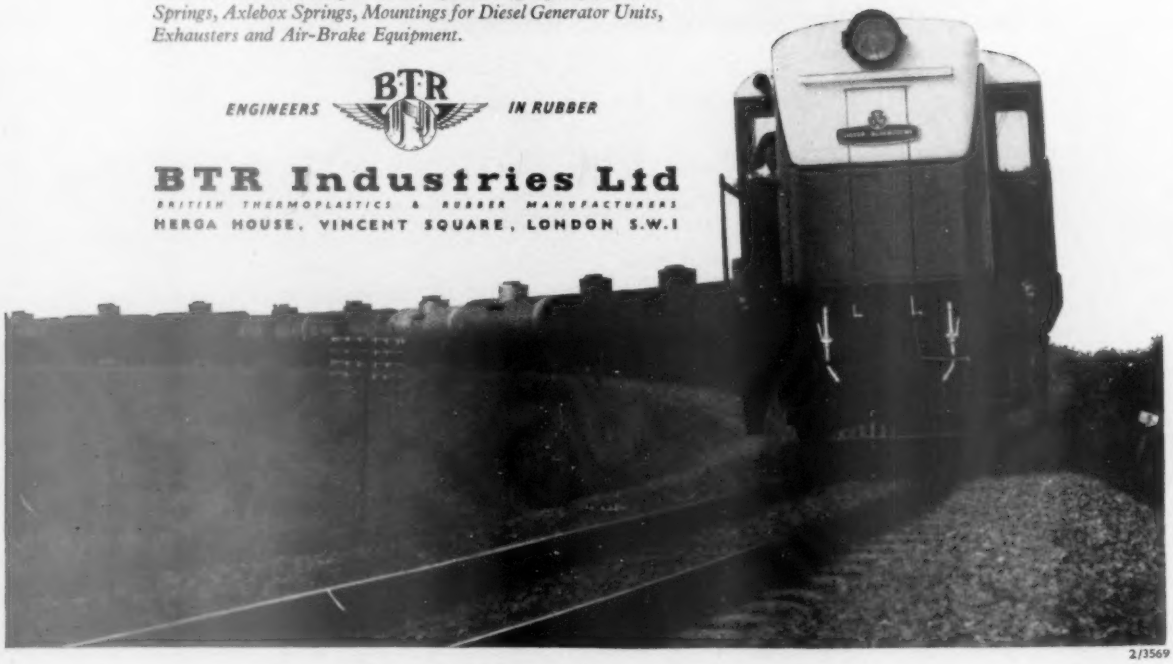
BTR Vibro-Insulators for Auxiliary Bearing Springs, Bolster Springs, Axlebox Springs, Mountings for Diesel Generator Units, Exhausters and Air-Brake Equipment.

ENGINEERS BTR IN RUBBER

BTR Industries Ltd

BRITISH THERMOPLASTICS & RUBBER MANUFACTURERS

HERGA HOUSE, VINCENT SQUARE, LONDON S.W.1



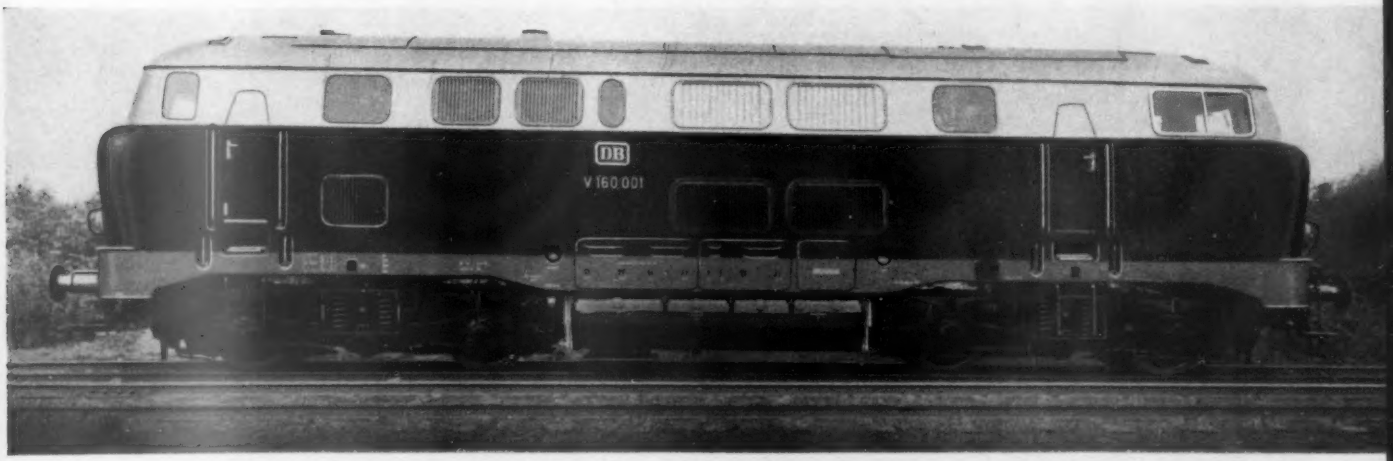
2/3569

KRUPP

Multi-Purpose Main-Line Locomotive Class V 160

This new diesel-hydraulic locomotive has been developed and designed by KRUPP in collaboration with the German Federal Railways.

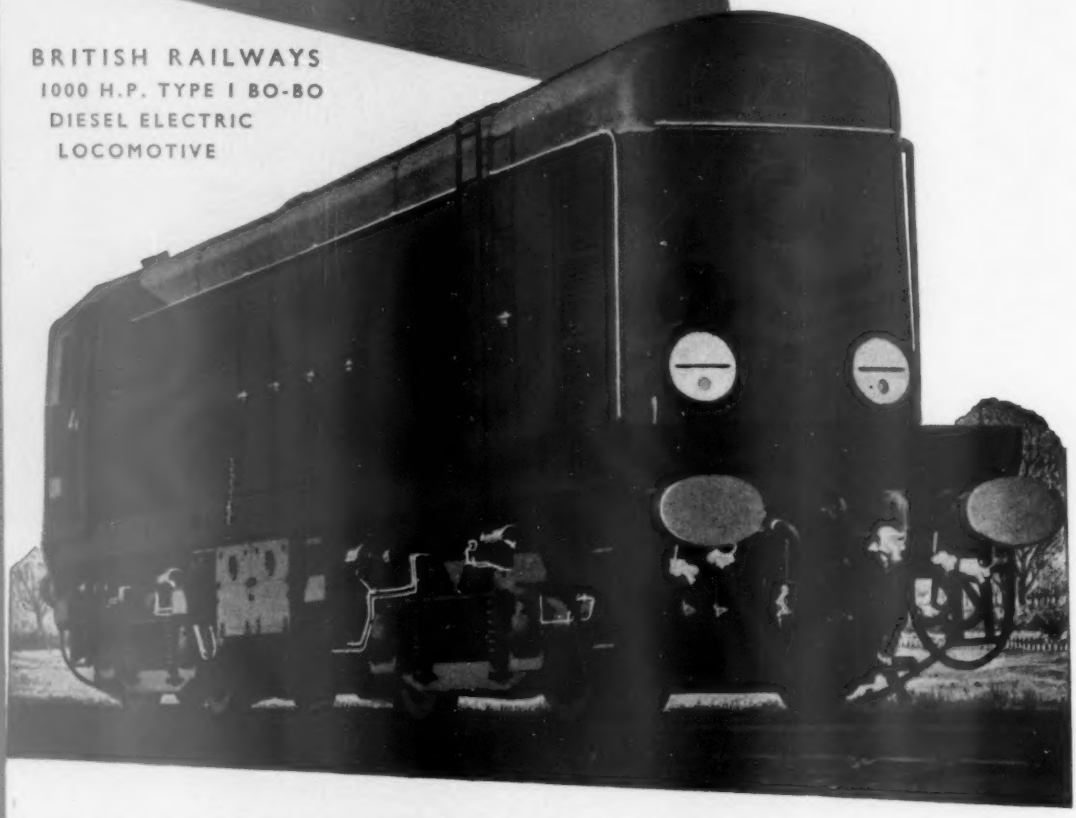
Top track speed	
in passenger service	120 km.p.h.
in freight service	75 km.p.h.
Lowest continuous track speed	
in passenger service, approx.	30 km.p.h.
in freight service, approx.	20 km.p.h.
Maximum starting tractive effort at the wheel rims	
in passenger service	18,000 kg
in freight service	24,000 kg



150 YEARS
KRUPP
1811–1961

FRIED. KRUPP MASCHINENFABRIKEN ESSEN

BRITISH RAILWAYS
1000 H.P. TYPE I BO-BO
DIESEL ELECTRIC
LOCOMOTIVE



50 OF THESE LOCOMOTIVES ARE NOW IN SERVICE ON BRITISH RAILWAYS (AND A FURTHER 78 BUILDING). CONSTRUCTED BY THE ENGLISH ELECTRIC CO. LTD., VULCAN FOUNDRY LTD., AND MESSRS. ROBERT STEPHENSON & HAWTHORNS LTD., FOR MIXED TRAFFIC SERVICE.
THEY ARE EQUIPPED WITH–

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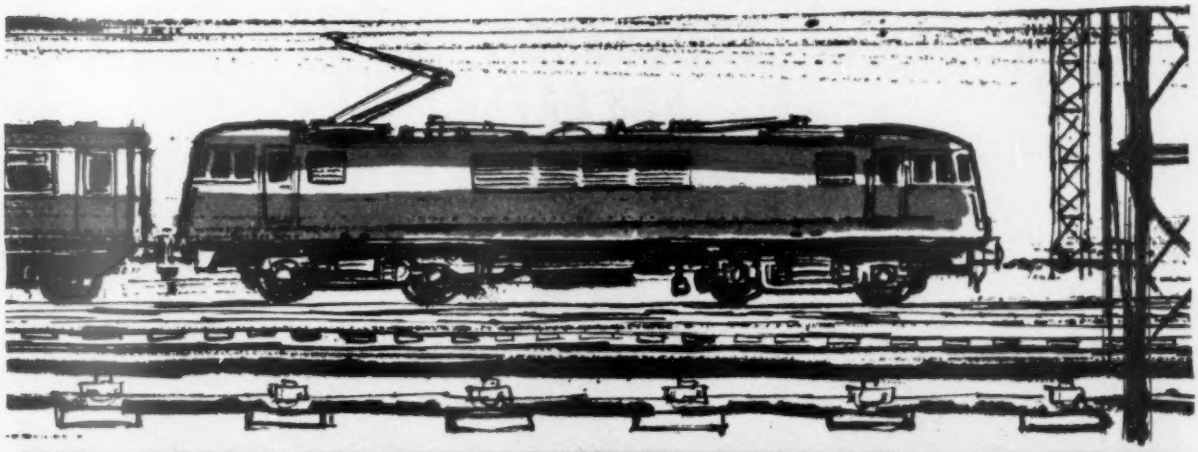
PATENTED
AIR AND VACUUM BRAKE EQUIPMENT

Manufactured at the Romiley and Dukinfield Works of

DAVIES & METCALFE LTD
ENGINEERS, ROMILEY · Tel.: WOO 2626 (3 LINES)

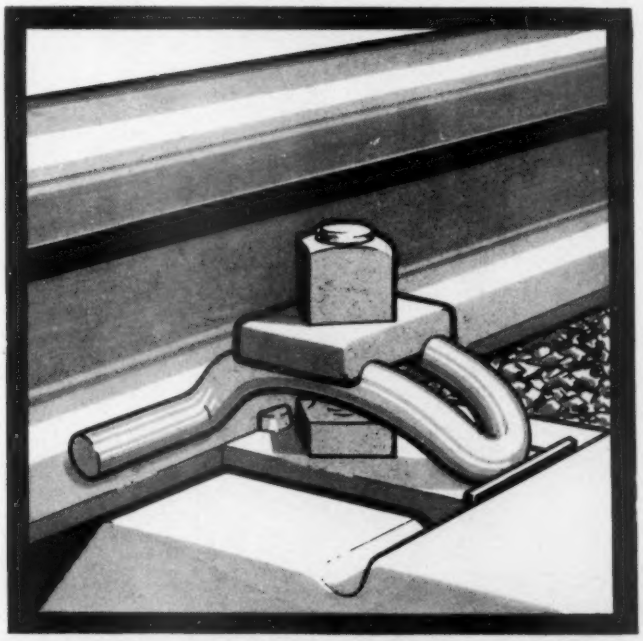
MAKERS OF MODERN AIR BRAKE EQUIPMENT AND ENGINEERS TO THE LOCOMOTIVE INDUSTRY SINCE 1870

RG.9.



KEEP TRACK

Today's 100 m.p.h. traffic makes big demands on the track. To help cope with this problem, Bayliss, Jones & Bayliss have developed resilient rail fastenings for use with concrete sleepers and long welded rails. Approved by the British Transport Commission, these tough spring steel fastenings are the latest additions to the BJB range, which still includes, of course, many traditional types of fastening.



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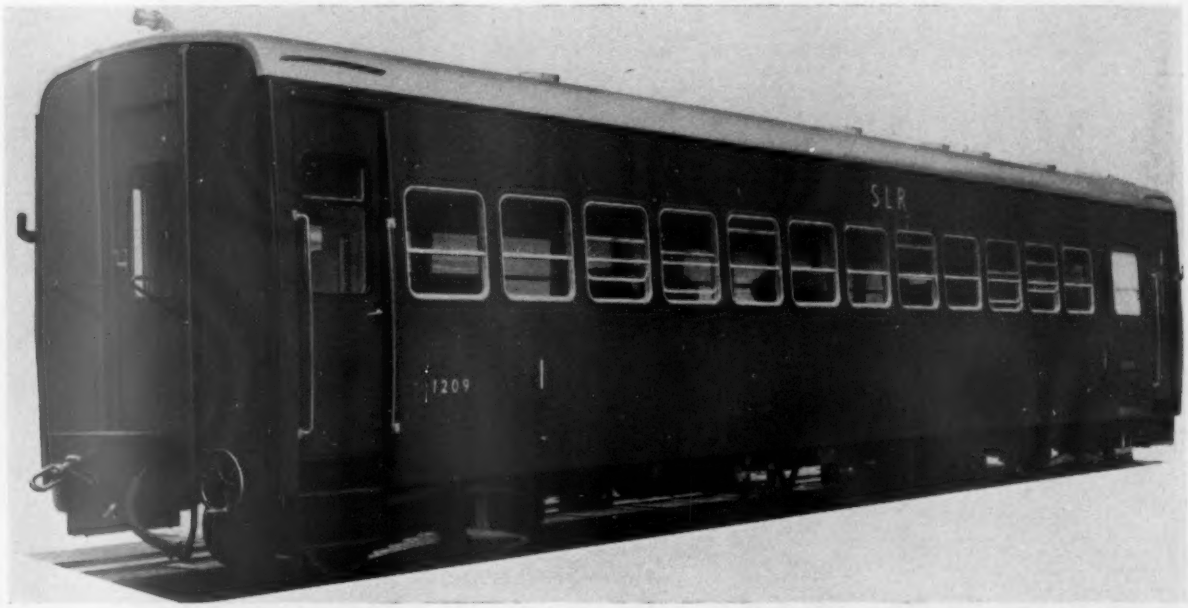

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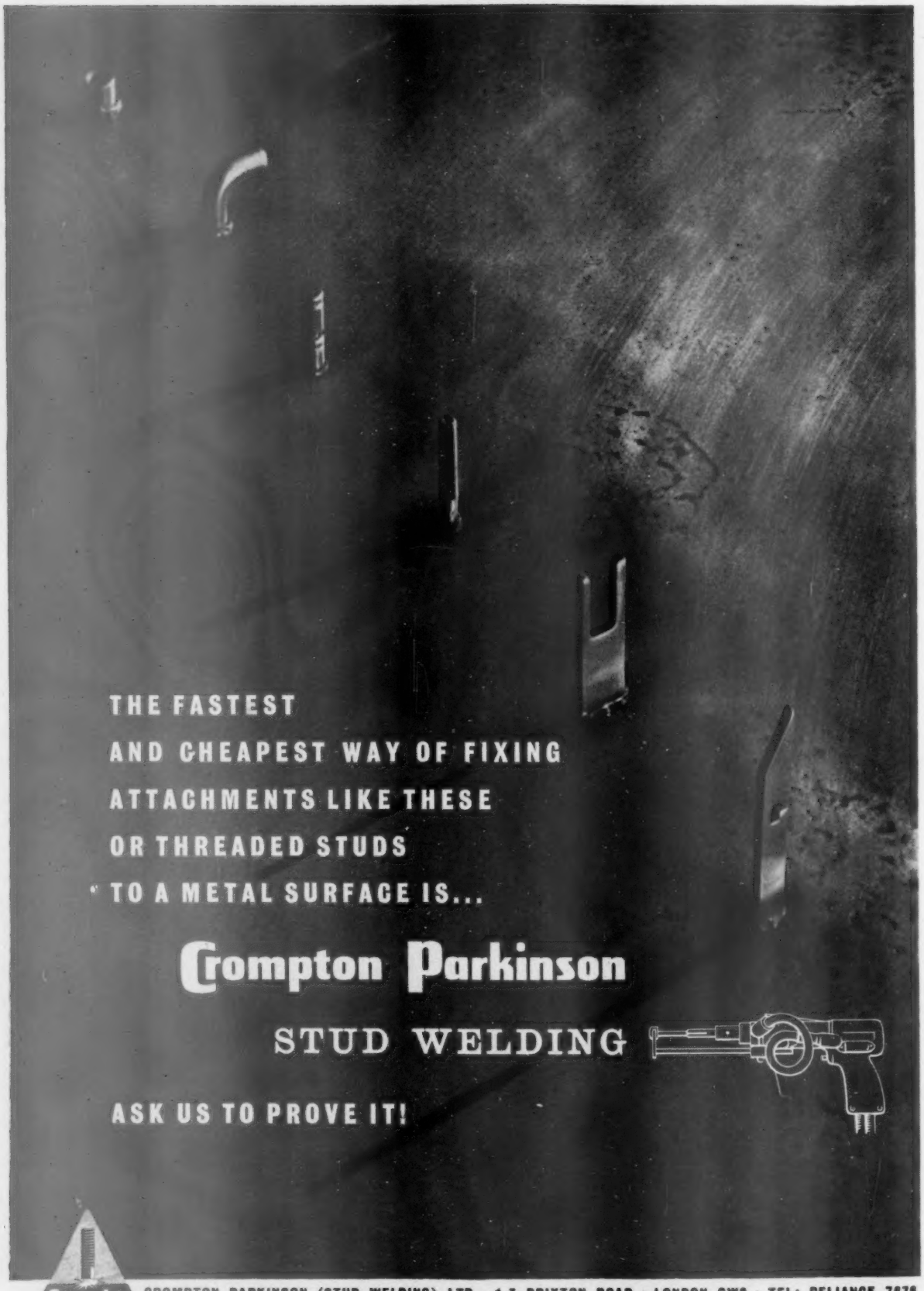
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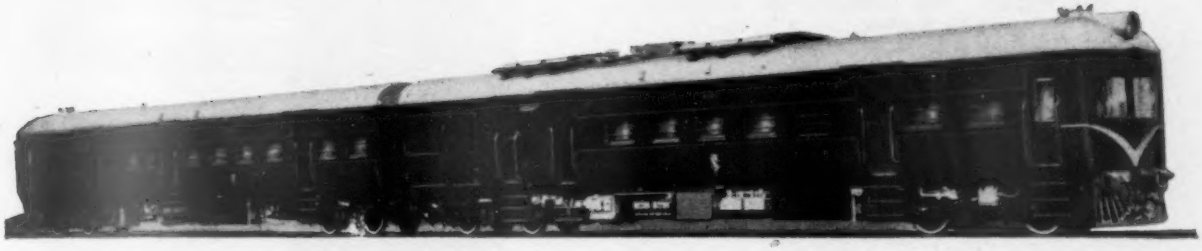

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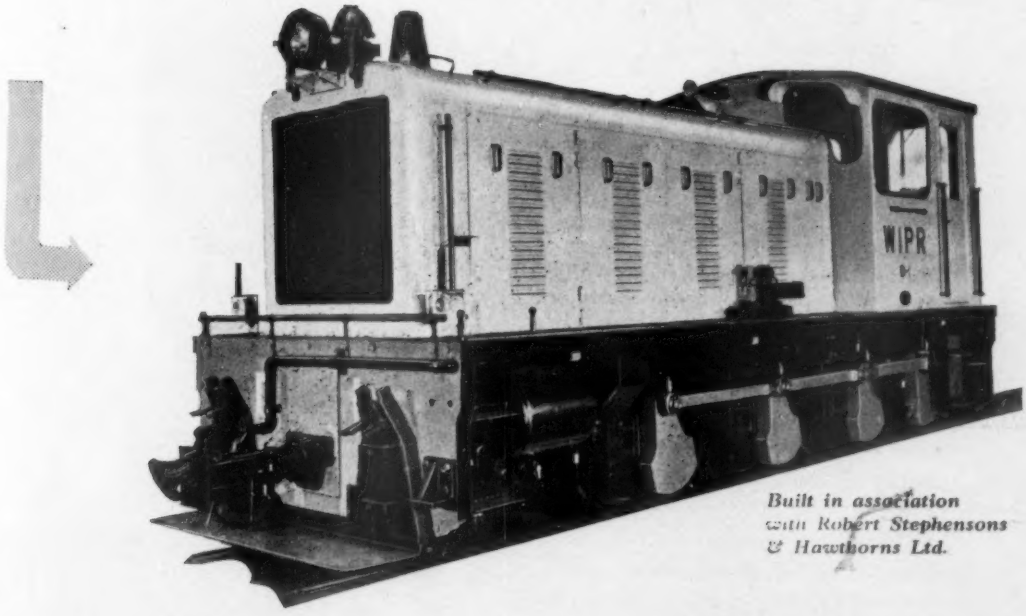

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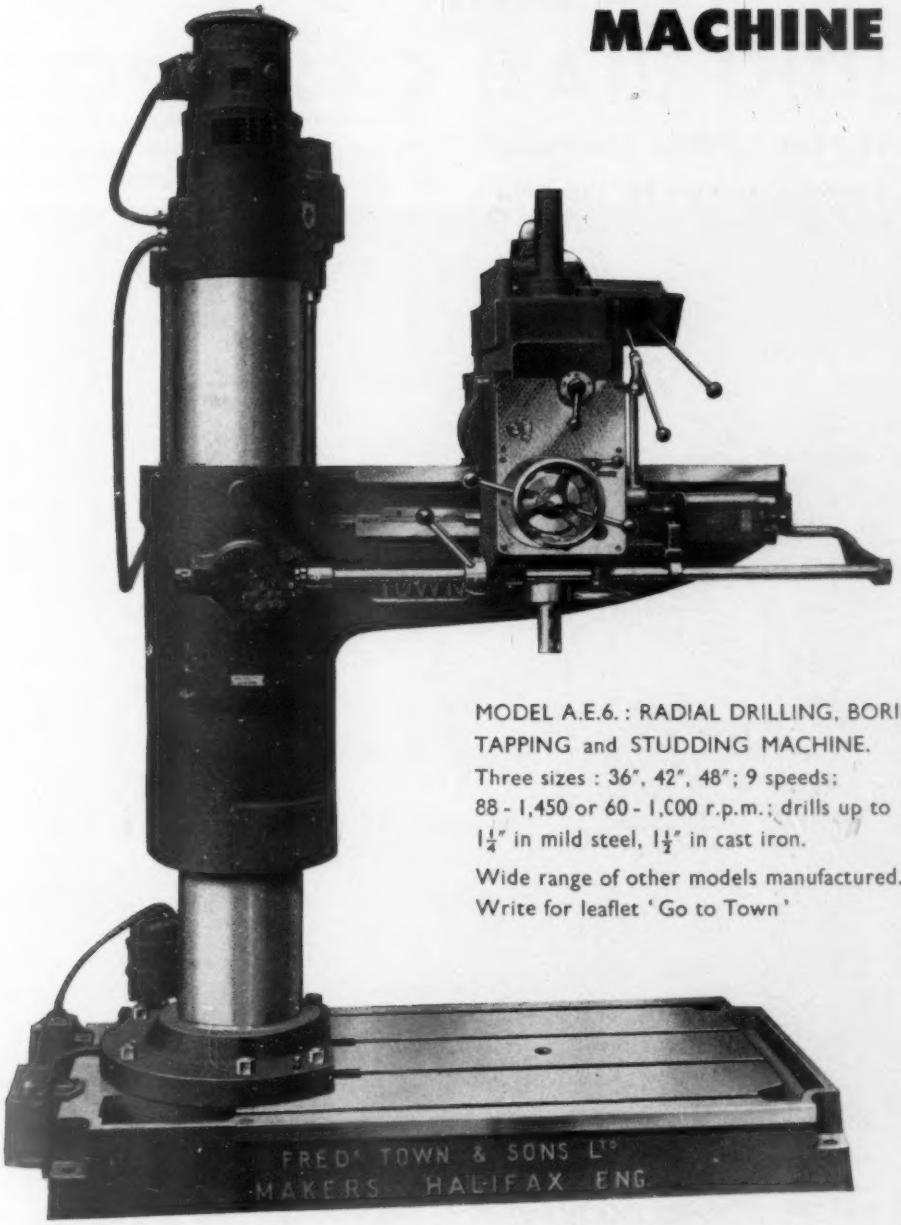

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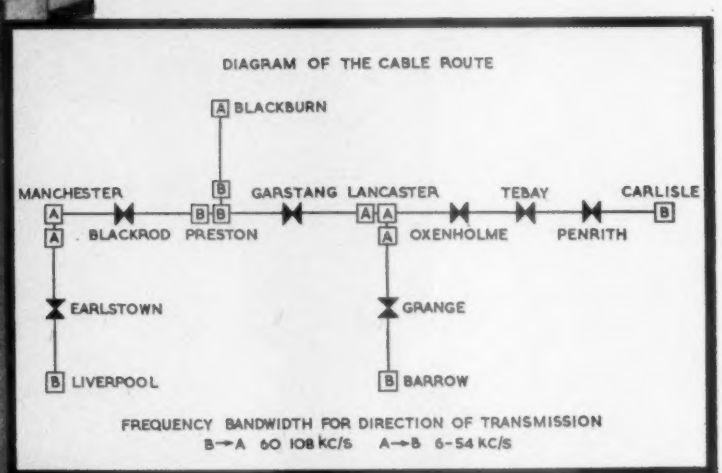

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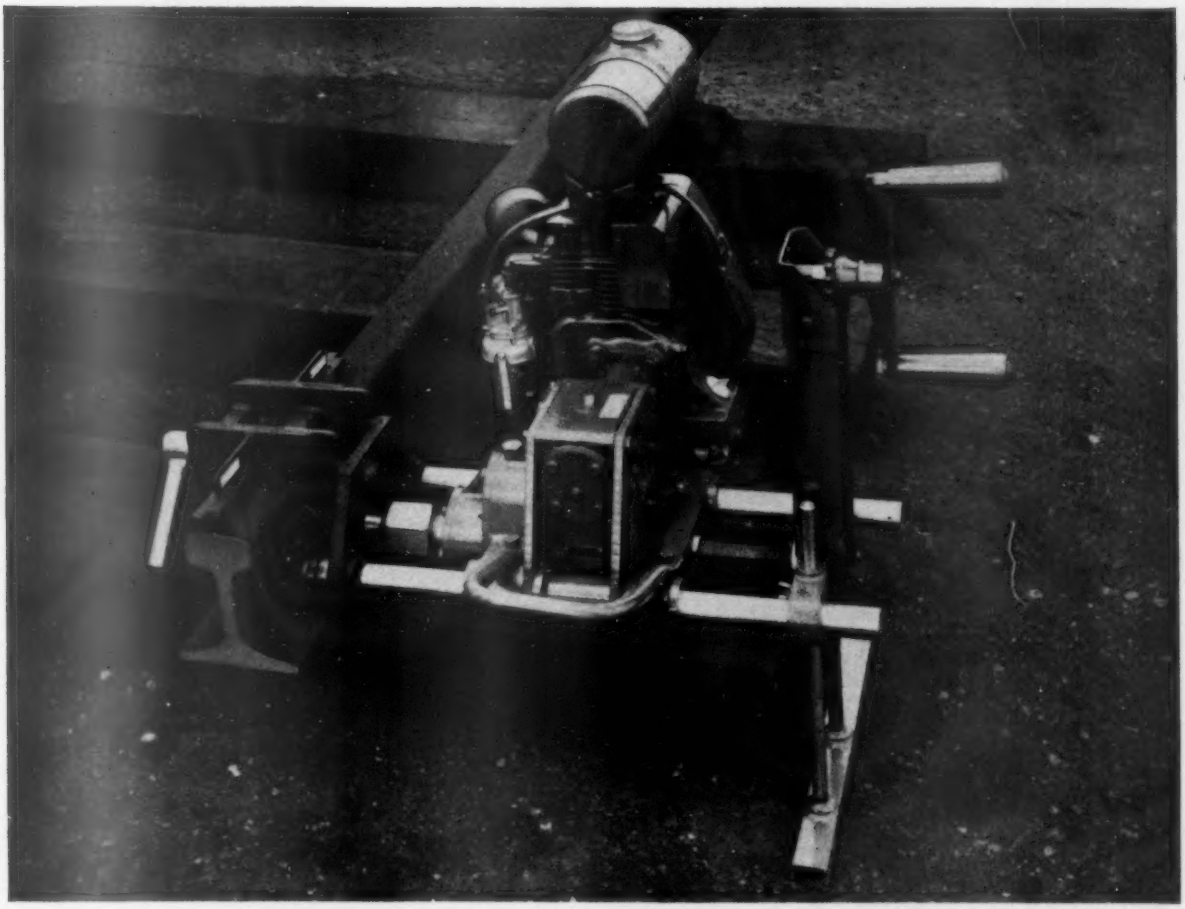

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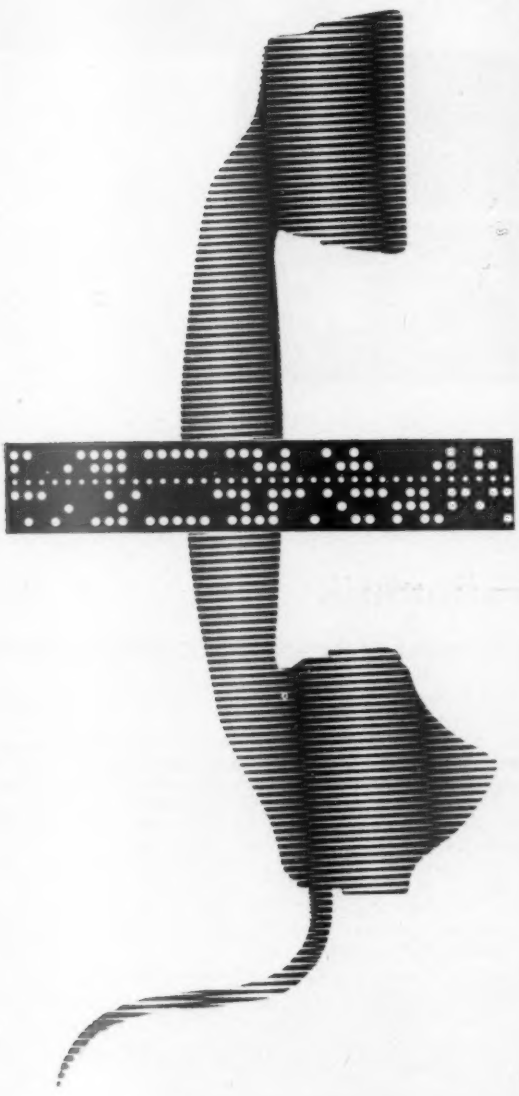

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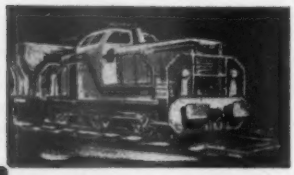

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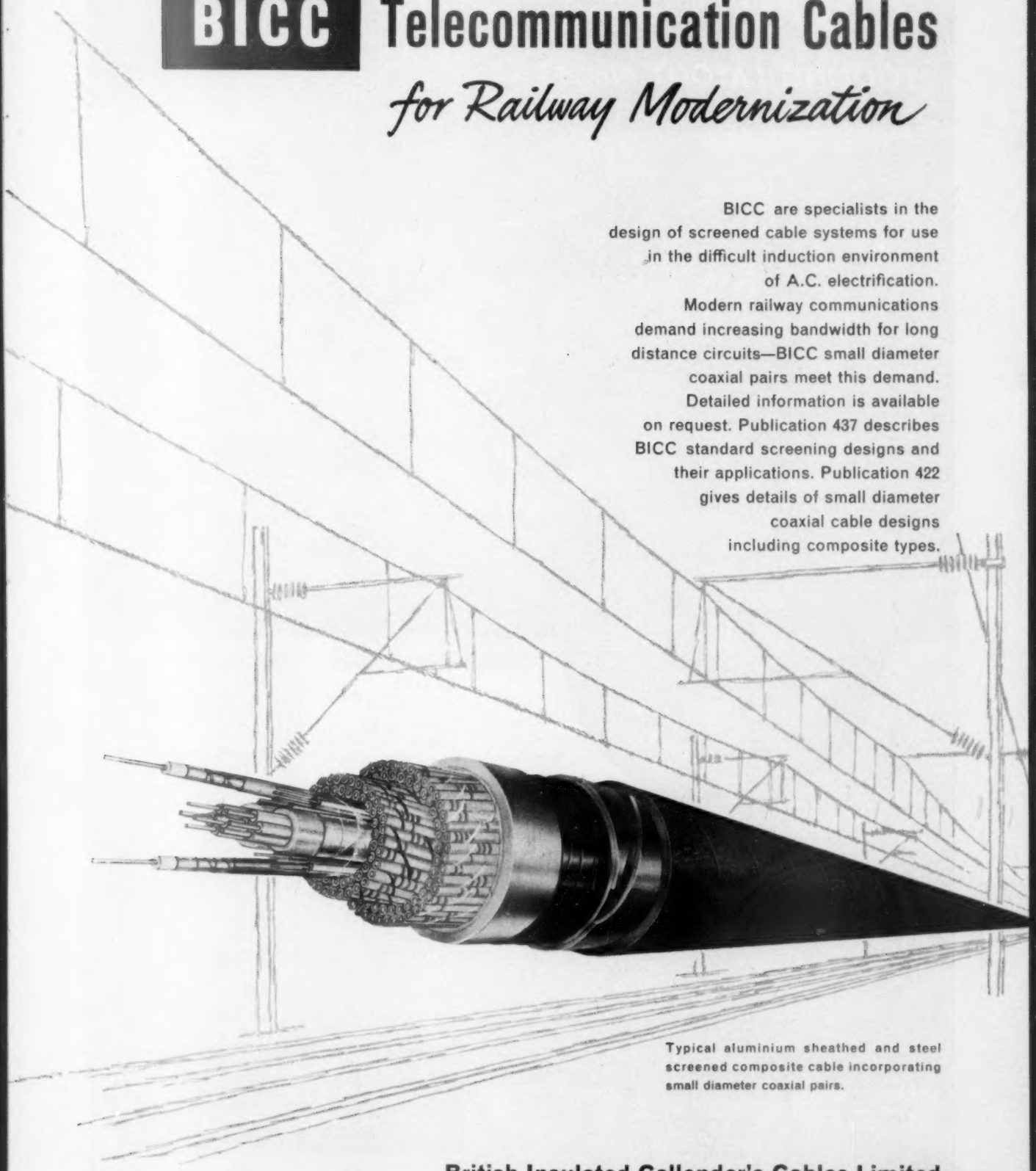

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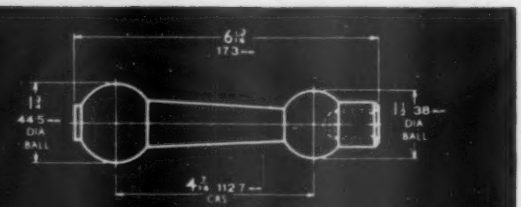

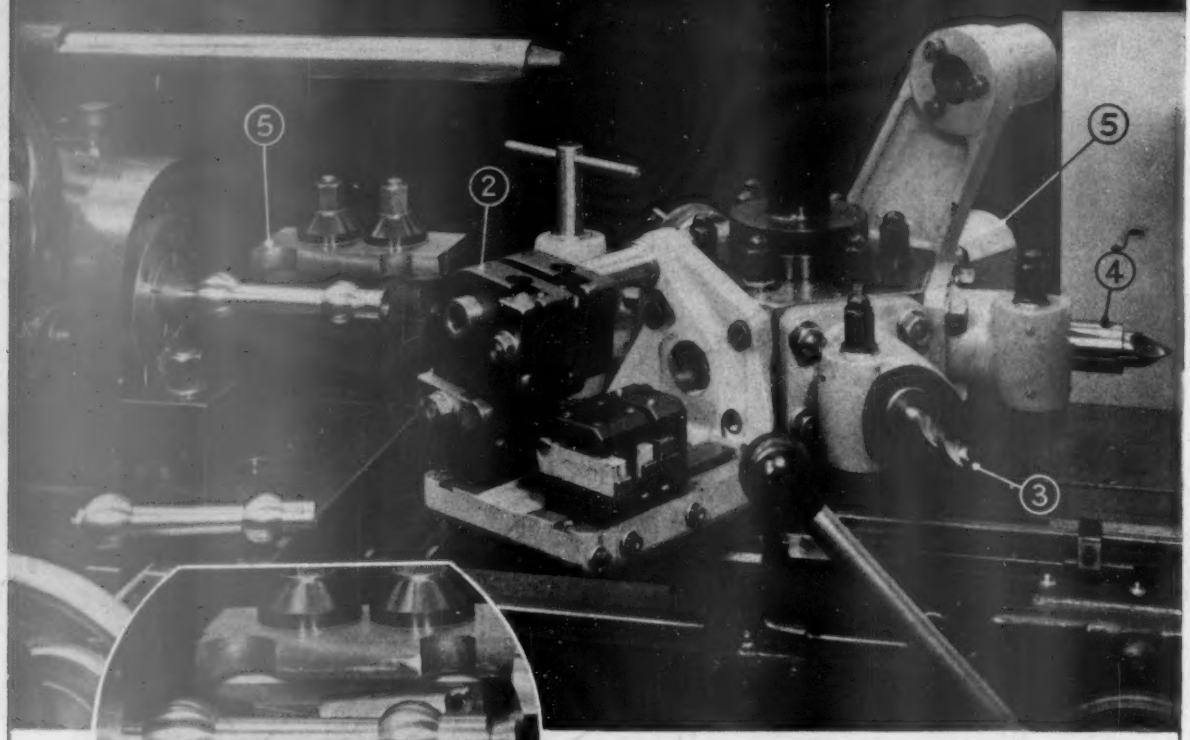

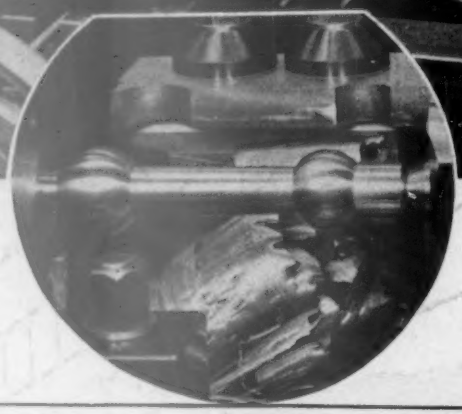

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2. Multiple turn two dias. & end	2	—	955	437	133	125	·203
3. Drill tapping size hole	3	—	955	137	41·7	125	·203
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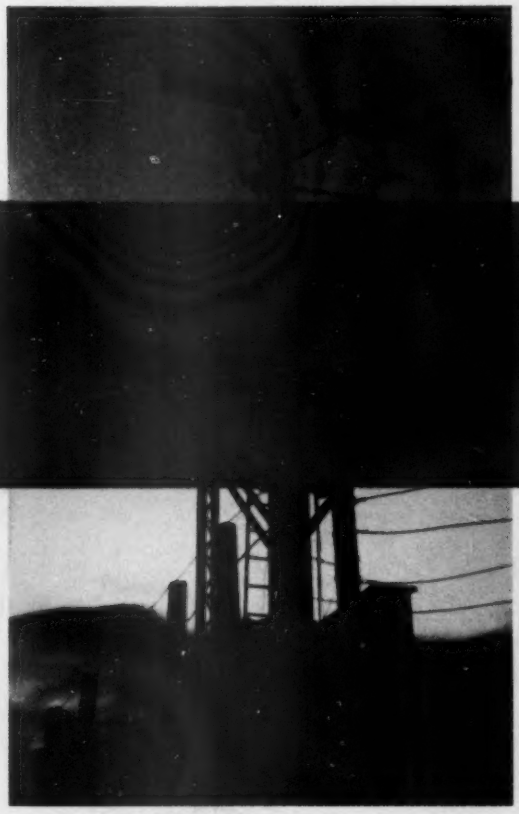

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A journal of Management, Engineering and Operation

VOL 115 FRIDAY AUGUST 18 1961 No. 7

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Editor: B. W. C. Cooke, Assoc. Inst. T.

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British Railways Board

IT WOULD appear that a position has now been reached in the formation of the British Railways Board at which consideration is being given to the appointment of one or more members from outside industry as, indeed, was suggested by the Minister of Transport in the early stages of the White Paper discussions. There has been some comment on the position that has arisen in both the daily and Sunday press, and it was suggested that the Chancellor of the Exchequer's wage and salary freeze in the public sector is causing some complication to Dr. Beeching. Men who have the qualifications required and who are willing to serve on the British Railways Board cannot be easy to find, and they will certainly not be available at the existing salaries of members of the British Transport Commission. On the other hand, it is easy to appreciate the dilemma in which the Ministry of Transport and through it the Chairman of the British Transport Commission could be placed. If the railway unions press on with their wage claims despite the edict by the Chancellor of the Exchequer and the Government stands firm in its proposal to enforce a pause in wage advances, the psychological effects of making appointments to the British Railways Board—or possibly in the first instance to the British Transport Commission—might be embarrassing to the Government as a whole. If, as is likely, an appointment had been decided on before the Chancellor's edict, there is no good reason why it should not be implemented. The British Railways Board will not become a legal entity until some time next year, when the necessary legislation has been passed, but it has been envisaged that it will take form as a shadow body this year so that the transition of the railway functions to it of the British Transport Commission may be made smoothly. The Deputy Chairmanship of the Commission will shortly be vacant and could be filled from within at current rates. Possibly, also, a further promotion from the present staff could be made on like terms to give, with one member from outside industry, a nucleus for the Shadow Railways Board.

Modernisation hold-up

THE news on Wednesday morning that the London Midland Region of British Railways is to hold up work on the £5-million marshalling yard at Carlisle came as a shock to many more than the 400 men involved in its construction. Despite the polite pretext given for the stoppage—that progress had been so rapid that work must be interrupted to keep within the year's Budget—it must appear that this is the first of a series of railway schemes to be strangled in aecordance with Government policy. A British Railways statement has maintained that the Commission is anxious to complete the yard as quickly as possible and that the scheduled completion date for the job is still 1962. Two of the contractors, Whatlings Limited, of Glasgow, and the Eagre Construction Company, had heard nothing officially of any stoppage—an indication of the extraordinary fashion in which this matter has been handled, presumably on Government instruction—and are awaiting a meeting with railway officials in London next week.

Pattern of future events ?

THIS development, which many expect to be followed by others, must have serious repercussions on the progress of railway developments in this country. Once again, Government policy has been shown to be less sympathetically inclined towards the railways than it is, for example, to the vast road-building projects which appear to be going forward without interruption. No business concern, no matter how large, can afford to abandon a project in the middle of its progress—the loss of money and morale is proportionately greater for small undertakings. From the railway point of view, the damage caused by hold-ups of the Carlisle type is immeasurable: the frustration and lack of confidence now being felt by officers and men, not only on the London Midland but in all the other five Regions of British Railways, must be at least matched by a very real fear for their future. From the regional point of view alone, a labour force of considerable size has been dispersed. It is time that the Government came out openly with its intentions regarding British Railways; is the nation to have a system

equal to, or better than, those of the Common Market countries, or has it been decided to switch over to road transport? Work, at Carlisle began two years ago. When completed, the yard, with 70 miles of track and 150 sidings, will be able to handle more than 5,000 wagons a day. It will be the most modern in Europe.

Growth of British Railways rush-hour travel

FIGURES issued by London Transport this week, based on a survey taken last November, show that 1,187,700 passengers use public transport to enter the West End and City in the morning peak hours. This is nearly 27,000 more than the year before and represents a total rise of 2 per cent. Underground passengers have increased by 18,700 in the morning and by 20,600 in the evening—a rise of 4 per cent. Over half a million people use the 50 Underground stations in the central area during rush periods. On British Railways suburban lines the number of travellers in the morning peaks has risen by 14,800 to 452,600 and in the evening by almost 6,000 to 407,300. It is expected that this trend will be accelerated this year as a result of further electrification and modernisation. More people are living further from London and switching from bus to Underground or suburban train services.

Decrease in bus traffic

BUS services have continued to carry fewer people to and from the central area and the number of morning peak passengers has dropped by nearly 7,000 to 215,600 and in the evening by about 6,000 to 179,500. These losses are more than compensated by the increased traffic on the Underground and on British Railways. The census also shows that peak periods have become heavier. Between 8.45 a.m. and 9 a.m., 181,500 people enter Central London—7,700 more than a year ago. In the evening, 192,400 passengers leave during the quarter-hour 5.30 p.m. to 5.45 p.m.—a jump of 4,600 over figures for 1959. A pointer toward further staggered hours with perhaps a reduction in the working day for many people is shown by the fact that, while homeward traffic has increased between 4.30 p.m. and 5 p.m. by 6,400, it has decreased between 5.45 p.m. and 6.15 p.m. by 4,500.

Stimulating competition

THE licensing application by Channel Air Bridge Limited to operate car-ferry services to Geneva and Basle, heard by the Air Transport Licensing Board on August 8, was supported by Mr. G. F. Turberville, Manager of the touring department of the Royal Automobile Club. Mr. Turberville contended that since the advent of airlines, facilities for motorists on British Railways had improved out of recognition. He cited the cross-Channel ferries, which had shown a big improvement with newer ships, and the introduction of car-sleeper services. These, he suggested, had been used by the railways to counter the growing competition from facilities provided by the airlines, and if the present application was agreed it would act as a stimulant to competition. It was stated afterwards, on behalf of the railways, that the improvements were not made wholly because of competition from airline companies but were partly the result of increased traffic.

World Bank loans

A LOAN of $80 million has been granted to the Japanese National Railways by the World Bank. This will assist in financing the new $548-million Tokaido line, which is due to be opened for service by the spring of 1964. The new line, of standard gauge, will be used for passenger and freight express services at speeds up to 125 m.p.h. A six-year modernisation programme is proceeding in Thailand. About 65 main-line and shunting diesel locomotives and some 1,650 new freight cars are to be bought. The World Bank has made a loan of $22 million to the State Railway of Thailand to cover about 40 per cent of the cost of the programme. The development of adequate rail transport is a long and high-priced process but is one which is essential to economic growth. The World Bank has aided railway projects in member countries with loans totalling nearly $1 billion.

Nairobi workshops, E.A.R. & H.

THE East African Railways & Harbours mechanical workshops at Nairobi cover an area of some 50 acres. The foundry, smithy, sawmill, machine boiler, and erecting shops, together with others for welding, painting, joinery, and carriage and wagon work, occupy buildings with an aggregate floor area of 650,000 sq. ft. Carriage and wagon construction is undertaken but the main function of these shops is the repair of locomotives, carriages, and wagons in use in Kenya, Uganda, and on the Tanga line. During 1960, 193 locomotives, 357 coaching units and 3,670 wagons were repaired. A feature of Nairobi workshops is the close co-operation between European, Asian, and African technicians and artisans working together as a team and numbering 154, 366, and 1990 employees respectively. Some are third-generation workmen, and there are comprehensive apprenticeship schemes for all races; a nearby railway training school was opened in 1956, providing a high standard of education.

The Swiss Federal Railways in 1960

IN ITS annual report for the year 1960 the Swiss Federal Railways show a profit of Sw.fr.31·4 million, the highest for their last 50 years of working, and the tenth consecutive one. Passenger traffic receipts rose by 9 per cent as compared with the 1959 figure to Sw.fr.392·7 million, and 1·2 per cent more passengers were carried. Goods traffic receipts, representing 60 per cent of the total, were up by 15·6 per cent, the total amounting to Sw.fr.599·7 million. The aggregate tonnage carried was 29·6 million tons, 70 per cent of this total being international traffic, which accounted for most of the increase recorded. Line capacity was enhanced largely by the extension of yards, rebuilding of stations, and line-doubling. Only 12 per cent of the train-mileage was steam-hauled. Double-heading on the St. Gotthard line was greatly reduced by the placing in service of the first 50 heavy 6,000-h.p. electric locomotives. Some 52 trains are now worked as push-and-pull shuttle services with electric locomotives at one end and a motorman's compartment at the other.

Good year for New South Wales Railways

THE New South Wales Government Railway system has achieved a surplus of £A25,246 for 1960-61 after a successful year's operations highlighted by records in revenue earned and freight carried. The railway had estimated for a deficit of £A1,860,000 for the year, and the surplus was achieved notwithstanding substantial increases in wages and salaries and increased contributions to the Railways Superannuation Fund and payroll tax. Probably the most significant feature of this year's operations was the record level of freight movement. The volume handled during the year represented an increase of about £A2 million on the previous year's level. This increase was mainly responsible for the record revenue figure of over £A89¾ million—more than £A6 million higher than the amount for the previous year.

Rationalisation of structural steel production

PROPOSALS are under consideration for a British Standard which will substantially reduce the number of sizes of steel beams rolled in this country. This measure should lead to greater economy in steel production and improve the position

of British manufacturers of structural steel and British fabricators seeking export business. The proposals will permit more frequent rolling of all sizes in the new list, and will assist in standardisation in design. The only effective way of ensuring cheap steel is by adopting a sensible range of sizes which will enable modern mills designed for mass production to be adequately loaded and so achieve minimum production costs. Since the introduction of universal beams in 1958, the number of " I " and " H " profiles has risen to 71. Adoption of the new proposals will reduce the number to 27. It is hoped to establish the new Standard by the end of this year and to withdraw the existing Standard covering sizes and weights of structural steel on January 1, 1963.

Wheel and axle machining

THE equipment supplied to Durgapur Steelworks by Craven Bros. (Manchester) Ltd. for wheel and axle machining is fully representative of British machine tools for large-scale production. The quantities involved have enabled many special-purpose machines to be designed, all of the robust type required for operation at the high cutting speeds possible with tungsten-carbide tooling. Automatic and semi-automatic cycles are used wherever possible and particular attention has been given to reductions in setting times. In the case of wheel tread and flange profiling, rough- and-finish machining proceeds simultaneously, as these machines are fitted with the Craven electric profile-copying equipment. Axle journals are burnished and wheel-seats cold-rolled on a dual-purpose machine. Swarf removal from the machine shop is expeditiously effected by a network of underfloor conveyors, which remove the swarf direct from the machines and discharge into wagons outside the shop. The shop layout has been arranged to provide a converging work flow of wheels and axles from the respective rough material stores to the wheel set assembly section. The plant is being installed and brought in use by Craven's engineers who will also be responsible for instructing Indian personnel in operation and maintenance.

A great Canadian iron-ore project

SO few new railways of any length have been constructed in recent years that the completion in December of the 193-mile line connecting Lac Jeannine with Port Cartier on the Gulf of St. Lawrence would in any case have been noteworthy. Actually, the topographical and climatic difficulties encountered by the engineers and the standard to which it was designed make this construction of outstanding interest; it is described elsewhere in this issue. Yet it is only one of four major works with which the Quebec Cartier Mining Company was faced when it decided to develop its important hematite iron-ore deposits near Lac Jeannine in the uninhabited wastes of central Quebec Province at an estimated cost of about £70 million. The other three were (1) a mine capable of producing 20 million tons a year and its attendant concentrator said to be the largest in the world; (2) the construction of an ice-free deep water harbour suitable for ore-carrying ocean ships with a minimum depth of water of 50 ft. excavated in solid rock, and (3) a 60,000 h.p. hydro-electric plant to supply power necessary for the whole project.

In fact, Quebec Cartier, a subsidiary of the United States Steel Corporation, aim to mine, rail, and ship its ore throughout the year to Atlantic Coast and European ports. The company's deposits are part of the vast hematite field in the Quebec-Labrador Trough stretching from Lac Jeannine—some 400 miles nearly due north of the City of Quebec—in the west, to Ungava Bay in the far north east. The Lac Jeannine ore, stated to be 30 to 35 per cent hematite, is being excavated in an open mine and treated in the near-by concentrator. The concentrate is then loaded into trains consisting of 125 wagons, each weighing 93 tons gross, and railed to Port Cartier, the exporting harbour on the Gulf of St. Lawrence.

At the port the shunting, dumping, sorting and breaking-to-size treatments of the concentrate are entirely automatic at the rate of 4,000 long tons an hour. The concentrates are then transferred by conveyor either to a ship-loader or to a steel storage shed housing 400,000 tons. Ship-loading may be either direct from the train or from storage, and can be carried out at a rate of 5,000 tons an hour. The hydro-electric scheme takes the form of a dam a few miles south of Lac Jeannine impounding the water of the Hart Jaune River which naturally flows into Lac Manicouagan, the largest lake in that part of the Province. The powerhouse at the dam produces the 60,000 h.p. for the mine and other activities.

A policy for exports

THE Chancellor's measures, announced on July 25, constituted a short, sharp shock. They were entirely negative, and indeed could well be described as " the mixture as before." Perhaps inevitably, they were unfortunate in their timing. They preceded the disclosure of the heavy July gold losses of £114 million, which might have convinced public opinion that something drastic was needed. They also preceded the announcement that we were about to seek means of joining the European Common Market. If this had been known, people might have realised that we must first put our house in order. Yet, all said and done, the Government was to blame in allowing an air of nervous expectancy to develop in advance of the Chancellor's statement. This alone forced the pace.

All that is history. What is needed is something positive, particularly to stimulate exports. So far, the Government has dealt three blows at our export trade. The cost of financing exports depends roughly on the level of Bank Rate, and this has been raised from 5 to 7 per cent. The power of the City to finance exports depends on the amount of money available, and we now have an intensified credit squeeze, due directly to the banks having been made to increase their special deposits at the Bank of England. For most industries one of the elements in the cost of production is the price of fuel oil. This has been increased, first by last April's Budget and now additionally by last month's overall increase in indirect taxation.

It may be argued that, if we join the Common Market, our exports will gain easier access to much of Western Europe. That may be so, but there are powerful arguments for and against our joining the Common Market. One is that our own home trade will be exposed to more intense competition from Europe. In any event there is no certainty whether or when we will join the Common Market. There are many bridges to be crossed first. We cannot wait for this eventuality. To help our exports, something positive is needed now. This should take two forms—a closer co-ordination of British industry, in both the public and private sectors; and direct steps to help exports.

Since the Chancellor's statement, the fourth report of the Council on Prices, Productivity and Incomes—the Committee known as the " three wise men " (Lord Heyworth, Sir Harold Emmerson and Professor E. H. Phelps Brown) has suggested that we have something to learn from French methods. Briefly, France has instituted an informal but effective system of " planning without control." It resembles an exercise of continual market research on a national scale, carried out under Government auspices by all sides of industry, including both the public and private sector. The idea is that long-term targets should be formulated on a coherent plan, and while there is no direct Government compulsion on anyone to conform, everyone knows the general pattern of aims and resources.

One of the many resulting advantages would be the mitigation of the existing antithesis between the nationalised industries and private enterprise. Railwaymen know only too well that, while privately-owned businesses are largely free to develop at their own speed, subject to their ability to raise the

necessary capital, the railway modernisation plan has been at the mercy of continual fits of " start, stop, go," simply because the extent and speed of new capital expenditure on railways has been used as a general economic regulator. The Chancellor's July statement contained a vague hint of repentance combined with a promise of greater continuity in the capital development of the nationalised industries. He has since dropped hints of a five-year plan to be evolved by the Government and both sides of industry. If something akin to the French plan were adopted, at least our railways and other nationalised industries would be on the same footing as private enterprise, without any sacrifice of the latter's independence. The importance of this to makers and exporters of railway material needs no emphasis. They cannot sell overseas unless they have an assured home market.

Next, all our exporters need help, rather than hindrance. The Government must rid itself of its fears of being accused of subsidising exports. It must not shrink from positive action. First, as suggested in these columns, could not profits derived from exports receive some rebate of income tax and profits tax ? There are intricate accounting difficulties, as well as fears of counter-moves by foreign countries. But are all these difficulties and fears insurmountable ? Second, must the cost of bank and other loans to finance exports be entirely dependent on Bank Rate ? Today, with Bank Rate at 7 per cent., and the rate on bank overdrafts at 8 per cent., the cost of financing exports, including the premiums paid to the Export Credits Guarantee Department, is, at the lowest, not far off 10 per cent. Now the banks have already made " special deposits " with the Bank of England to the amount of £172 million, and a further £61 million is due to be made by September 20. The suggestion is that the banks should be free to use these deposits for the sole purpose of financing specific export transactions, and that they might charge exporters one per cent more than the special deposit rate. Even this suggested rate is too high, because the special deposit rate is approximately the same as the current Treasury Bill rate, which is now about 6¾ per cent. But if the banks could lend to exporters at the special deposit rate itself, the loans perhaps being secured by cover from the Export Credits Guarantee Department, it would help a lot. This is a practicable idea, which could be carried out at once, and would certainly make export finance cheaper.

Finally could we not follow the United States in founding our own Export-Import Bank ? No doubt, as in the United States, this would have to operate with Government funds. But the cost to the bank of these funds could be tied to the prevailing rate on short-term Government securities, which today in London is well below Bank Rate. Even admitting that the new bank would have to charge exporters enough to cover its own expenses, this would be a further way of cheapening export trade.

Here are three suggestions. They may be difficult to carry out, but at least they are positive. What the Chancellor did in July was purely negative.

Southern Region winter timetables

THE Southern Region timetable plan today in general is to introduce changes if any, in the summer, and to make no further alterations of any consequence during the ensuing 12 months. It is the more surprising, therefore, to note the acceleration of the " Atlantic Coast Express " which is to take effect from September 11 onward. For the first time on record the schedule between Waterloo and Exeter is to come below 3 hr. in both directions, to 2 hr. 58 min. Down and 2 hr. 59 min. Up. This will include a time of 80 min. both ways over the 83·7 miles between Waterloo and Salisbury (62·8 m.p.h.), of 75 min. for the 75·9 miles from Salisbury to Sidmouth Junction, and of 74 min. in the reverse direction. It is doubtful if ever before in Great Britain mile-a-minute timings have been laid down over a line with such gradients as this, at various points as steep as 1-in-80.

This speed-up throws into sharper relief the leisurely timings of the other express trains over this route. The 1 p.m. Down is allowed 43 min. longer to Exeter with six intermediate stops compared with two; the 3 p.m. 33 min. more with five stops; and the 7 p.m. 19 min. more with only one stop additional to the two made by the " Atlantic Coast Express." Still more notable is the fact that the 10.30 a.m. Up from Exeter requires 3¾ hr. to reach Waterloo with five stops, 46 min. more than the " Atlantic Coast Express " with two stops. Equally on the Bournemouth line the time would seem opportune when, with the very competent modified " Merchant Navy " Pacific power now available, the extra fare " Bournemouth Belle " Pullman, despite its weight, might be levelled up in speed to the two-hour expresses, both Down and Up, which also have only one intermediate stop, at Southampton Central. This would require an acceleration of the Pullman by 10 min. Down and 6 min. Up.

The 9 a.m. from Waterloo no longer will have a connection for Ilfracombe; the present through coaches will run no further than Barnstaple Junction. This will leave three through services only from Waterloo to Ilfracombe daily (apart from the 1.10 a.m. newspaper train), at 11 a.m., 1 and 3 p.m., as compared with five Up, at 8.10 and 10.30 a.m., 12.15, 2.20 and 3 p.m. On the Bournemouth line, the 8.30 a.m. 2-hr. express from Waterloo (altered in the summer service from the previous 8.20 a.m. departure) will have its fast Weymouth portion combined with the present 10.50 a.m. slow from Bournemouth Central, so reaching Weymouth 23 min. later, at 11.58 a.m. This year the 7.30 p.m. from Waterloo will have a through Weymouth portion throughout the winter.

The 8.35 a.m. from Bournemouth West (8.45 a.m. from Central), now a through train to Waterloo, is to run instead as a buffet car train to Birmingham and Wolverhampton, in place of the present 9.30 a.m. to Birkenhead. The latter in its turn will run to Waterloo, calling at the same intermediate stations as the 8.35 a.m. to Basingstoke, and also at Woking, and reaching Waterloo at 12.32 p.m. In the reverse direction, the through service from the Birmingham line will start from Wolverhampton at 11.5 a.m. (instead of 9.30 a.m. from Birkenhead and 12.20 p.m. from Wolverhampton) and will reach Bournemouth West at 4.11 instead of 5.35 p.m.

On the Eastern Section it is, perhaps, a little disappointing that with the introduction of electric operation over the Tonbridge main line to Folkestone, Dover and Deal, even though this has been ahead of schedule, nothing in the way of acceleration apparently is to be attempted with electric haulage during the nine months' currency of this timetable; even if the former Charing Cross–Folkestone 80-min. timings of the principal trains could have been restored it would have given some useful advance publicity as to the fruits of modernisation. Nothing of the kind has happened, however, and, incidentally, the name " Man of Kent " has been withdrawn from the 1.10 and 4.10 p.m. expresses from Charing Cross to Folkestone, Dover and Deal and the corresponding return workings.

On the Kent Coast line, certain changes incorporated in the summer timetable are being continued throughout the winter. They include the provision of buffet cars on the 11.40 a.m. and 4.40 p.m. from Victoria to Ramsgate and the corresponding Up trains at 9.10 a.m. and 2.10 p.m. from Ramsgate, so that refreshments are now obtainable on the entire hourly sequence from Victoria from 9.40 a.m. to 7.40 p.m. inclusive, and from Ramsgate up to 5.10 p.m., together with three out of the four business trains from and to Cannon Street. The combination of the last two evening trains at 10.40 and 11.30 p.m. from Victoria to Ramsgate into a single working at 11.10 p.m. also is to continue.

Stability of long-welded rails

IN 1953 an exhaustive testing programme was initiated by the Civil Engineering Laboratory, Western Region, British Railways, to investigate the conditions and factors affecting

the stability of long-welded rails, mainly directed to suit British Railways field conditions.

Initially, half a mile of welded track was laid and continuous recordings were made at 18 points along this length to show (1) rail movements in three dimensions and (2) relative air and rail temperatures. Rail air temperatures were measured at one point only on a dummy rail about 5 ft. long orientated correctly parallel with the track and mounted on similar sleepers and fastenings. The essential results considered were the longitudinal movements of the unrestrained length of about 100 yd. at the end of the welded rail and a range of temperature between 8 deg. and 128 deg.F.

To study the factors involved in track buckling, lateral deflection was induced on a 120-ft. length of track mounted on rollers with a distance between lateral reaction points of 20 to 106 ft. It was soon seen that conventional deflection formulae did not apply, especially in respect of overall stiffness of track, and that this varied with the length deflected, amount of deflection, sleeper-spacing, type of rail fastening, and rail section. These preliminary investigations took no account of the effect of ballast. As a result of them a further series was undertaken to study (a) individual factors concerned and (b) their interaction on the whole problem.

The first consideration under (a) was the effect of torsional resistance of the fastenings of various types. Their behaviour with regard to torsional resistance depends more on the mechanical design than when a baseplate or chair is used. The latter is governed by whether a flat-foot or a bull-head rail is being used. Details of the results recorded are shown in graphs and formulae in the excellently-produced brochure, "Stability of long-welded rails" published by the British Transport Commission. The values of torsional coefficients of some 25 types of fastening involved in nearly 60 tests are given in Table 6 of the brochure. To obtain information on the behaviour of sleepers, rails, and fastenings simultaneously, a lateral bending test was devised for deflecting a 30-ft. section of track under lateral point-loading. Various sleeper-spacings and types of fastening were used and suitable formulae were evolved.

The effect of ballast was then investigated in a series of tests to ascertain its resistance to the lateral and longitudinal movement of both timber and concrete sleepers with different quantities of ballast and degrees of compaction; in some cases dirty and wet ballast was used in the site tests, laboratory and site tests were made and for comparison a summary of both types is shown in Table 3 of the brochure. Briefly, the fastenings were loosened over 60-ft. lengths of track and the rails removed. Then 15-ft. lengths stiffened with diagonal bracings were fitted over six sleepers, the fastenings were re-tensioned and the 15-ft. panel pulled slowly laterally through the ballast, the applied load being measured by a proving ring; the corresponding movement of the track was also measured, and the load-movement curve, similar to that in the laboratory tests, was plotted.

In the course of both static and dynamic tests for longitudinal creep resistance, the importance of the resistance to creep of the fastenings was confirmed. The machine used for the dynamic tests simulated the passage of an 0-6-0 locomotive, two hydraulic rams controlled by cam-worked valves acting downwards to produce bending movements in the rail. After a standard dynamic run of 50 hr., the creep resistance was compared with the original value.

In the main buckling tests on a 120-ft. test-bed, a length of track was subjected to thermal stresses in such a way as to simulate the central portion of a length of long-welded rail which does not move with changes of temperature. The 120-ft. rails were anchored at the ends to prevent rotation of the track and change of gauge but not expansion of the rails. The latter was controlled by four tie-bars, two each side and clear of the test track. The tension in these bars was transmitted by hydraulic jacks to massive steel beams against which the ends of the rails butted. Tendency for the rails to expand was thus counteracted by the jacks, which were not used directly to induce compression in the rails; longitudinal movement of their ends was registered by four dial-gauges. By operating the jacks, rail lengths were kept sufficiently close to their original values to be consistent with actual conditions in the field. Loss of load in the track when buckling occurred as a result of rail expansion could be calculated from the gauge readings and the alignment of the buckled track.

Electric heaters on one side of each rail and mounted end-to-end in banks of six with parabolic reflectors simulated heat radiation from the sun. Their distance from the rails was adjusted to avoid excessive rail heating. Normal glass and mercury thermometers placed in pockets drilled in the rail 10 ft. apart measured the temperature. With the coefficient of expansion of the rail steel, the temperature-rise, and the cross-sectional area, together with the extent to which expansion was restrained as known quantities, the load in the rails was deduced.

From formulae deduced, as explained in the brochure, and under given conditions, as well as from the buckling tests, the critical buckling length for F.B. rail was found to be approximately 20 ft. A site investigation was carried out to ascertain the practical standards of maintenance existing on main-line track, related to the critical length. This investigation included (1) the measurement of misalignment on that length, (2) the number of consecutive hanging sleepers, and (3) the percentage of undertensioned fastenings. It was found that (1) was $\frac{1}{4}$ in., (2) could vary from 100 per cent downward, and (3) could be 50 per cent. With hanging sleepers, ballast resistance is limited to the shoulders. Assuming these as the worst conditions and that they act simultaneously on a length of track, the ultimate buckling load of track with timber sleepers and elastic spikes works out at 122.56 tons. This load would be caused by a temperature-rise of 68.1 deg. F. For a normal range of 70 deg.F. the load may be taken as 126 tons if 24 sleepers to a 60-ft. rail are used. For further information, the brochure—replete with formulae, diagrams, tables, and excellent photographic illustrations—may be studied.

Proposal for a unique U.S.A. railway merger

BY A CORRESPONDENT

IN the Northwestern Region of the United States, the Great Northern Railway operates 8,279 miles of road between Minneapolis and St. Paul and the Pacific. Its lines in the states of Minnesota, North Dakota, Montana and Washington are close to the Canadian border, while branch lines serve Winnipeg and Vancouver. Through these states, but further south, the Northern Pacific Railway operates 6,800 miles of road, stretching from the "Twin Cities" to Seattle. The two railways own the Spokane, Portland & Seattle line of 936 miles, extending to Ben in Oregon. The Pacific Coast Railroad, a subsidiary of the Great Northern, runs 80 miles further south to Bieber in California, where it connects with the Western Pacific.

For many years the Great Northern and Northern Pacific have had equal ownership of the Chicago, Burlington & Quincy, which operates 8,646 miles of road, forming a through route between the Northwest and lower mid-West territory. Having many common interests, the three great railways have worked together to improve their services, but many costly duplicate facilities exist, and it is considered that unification will combine the best features of each enterprise and provide improved operation, together with substantial economies.

If the merger is effected, the Burlington will probably be the predominant source of energy. For 60 years it has been a progressive railway. In 1882 it extended its westward line to Denver, over 1,000 miles from Chicago. Four years later it opened a line from Chicago to the Twin Cities which followed the course of the Mississippi for about 300 miles. On this new route the morning "Zephyr," as its fast trains were called, covered 427 miles in 360 mins., though it made

seven stops—providing an average speed of 71 m.p.h.

Perhaps more remarkable was the starting of the "Californian Zephyr" in 1947. This great trans-continental train left Chicago at 3 p.m. and arrived at Oakland at 4.15 p.m., two days later, after a journey of 2,532 miles and a climb to a height of 9,239 ft. at the Moffat Tunnel on the Denver & Rio Grande. Zephyr is a misnomer for this massive train, but it runs through fine scenery in daylight and does well in spite of airline competition. Along with the Santa Fe, the Burlington was a pioneer in moving freight trains by diesel power and so reducing transit times between Chicago and the Far West. In union matters, such as the use of double-deck coaches for suburban services, the Burlington was always well to the front. A repetition of the spirit of enterprise displayed during the presidency of Mr. Ralph Budd would ensure the success of the amalgamation, which would be unique in consolidating undertakings, whose interests are already interlocked closely.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

RAILWAYS INTO ROADS

August 8

SIR, I am pleased to see the interest that is being taken in railway conversion as it seems to me that the time has now come to convert many of our railways into roads.

The disused Hull & Barnsley line should certainly be converted, and the Great Central Line from London to Sheffield and the Midland and North British lines from Settle via Carlisle to Edinburgh would be far more useful to the country as roads than railways.

Yours faithfully,

W. D. MITCHELL

26, Tranby Avenue,
Hull Road, York

RAILWAYS INTO ROADS

August 4

SIR, For Mr. Watkinson's information, any number of trains can be run on a 90-sec. headway over a single one-way track as often as passengers demand them. As passengers want to get on, they will cram into the first one that comes, and would probably be cross if the train were replaced by a convoy of buses in which they were compelled to be seated in comfort or else wait for the next. As to speeds, a train on ordinary track *can* manage 205 m.p.h., which is not bad for such large vehicles, but your Harrogate correspondent is doubtless more interested in commuters' trains at the moment. Between Liverpool Street and Clapton, which is four miles, the start-to-stop speed is 30 m.p.h. and headway 120 sec.

Of more ambitious commuters' train speeds, we find 53·53 m.p.h. between Liverpool Street and Colchester, and 50·5 m.p.h. Victoria to Brighton, both non-stop, the distances being 51¾ and 50¼ miles respectively. The trains by which I commute over 38 miles average 46·5 m.p.h. with two stops and 46·74 m.p.h. with no stops. Top speeds are usually in the middle 70's, and each train consists of 11 coaches and a buffet car. We may not particularly love our trains—certainly there is no sentiment about them—but we would be doubtful about accepting their volume in buses, at even these unexciting speeds, with movements subject to manual steering, relatively rudimentary signalling, and overtaking in what we presently call the six-foot way. By the way, are Mr. Watkinson's "eight lanes of motorway," presumably the converted version of the three Up and three Down outside Liverpool Street, to be in fact four Up and four Down? Because they would have to be. And 240,000 passengers an hour, buses being mixed up with (one hopes) advanced motorists, seems optimistic. The suggestion is not explicit, and we are still waiting for terminal details. If it were buses only, 4,000 would have to be dealt with.

To Mr. M. J. Douglass's address be it remarked that the point of the District Line, *exemplo gratia*, is the small amount of space it takes up compared with an equivalent "unimpeded road traffic lane." I suggest that Dr. Smeed's proportions, quoted earlier, are unanswerable. The thesis that a bus is more comfortable than a train is absurd, unless it involves a choice of good bus or bad train. One notes that Mr. Douglass has permitted himself the cautious conditional, which is reassuring in view of the drastic things he counsels without any certainty of their succeeding. Last—I *thought* he would dislike that lollipop! A suggestion of double-talk is seldom palatable.

Yours faithfully,

C. HAMILTON ELLIS

Southesk, Mannings Heath,
Horsham, Sussex

MICROWAVE RADIO-TELEPHONE SYSTEMS

August 5

SIR, It may be instructive to compare Mr. R. W. Hanstock's account of a pioneer scheme for the North Eastern Region in your August 4 issue with the progress which the Denver & Rio Grande Western Railroad has made in the Rocky Mountains—a complete contrast to the broad acres of Yorkshire. This enterprising American line operates 2,128 miles at heights varying from 4,000 to 10,000 ft. The front cover of its 1960 report shows an eastbound freight train passing the microwave relay station at Pyramid, Utah. The caboose is not in sight as the train probably consisted of 67 wagons, with a net load of about 1,600 short tons moving at 20·8 m.p.h.

The report also contains a map showing the position of other microwave stations, along with a picture of the terminal one at Ogden, equipped with the usual tower and dish. The construction of microwave transit facilities was largely completed in 1960 and system telephone dialling was extended to additional points on the railway. The communications network has been developed in conjunction with what the railway calls its "electronic data-processing system," for which facilities have been installed at Denver Headquarters. This year the Rio Grande hopes to be the first U.S.A. railway to serve the entire main line by supplying details of its operations, which have been improved by the extension of centralised traffic control to much of its mileage.

Last year the Rio Grande spent $465,730 on communication systems, but its report does not give a separate figure for microwave installations. The railway can afford the experiments as last year it handled 5,380 wagons, 1·25 per cent more than in 1959, had an increase of 8 per cent in revenue net tons and 3 per cent in revenue ton-miles. Its freight revenue was up 1·4 per cent and its passenger revenue 2·4 per cent. Its operating ratio was held down to 66 per cent, while its net train-load was raised by 54 tons to 1,596 tons without impairing train speed. The output of freight train operation in a train-hour reached a peak of 70,058 gross ton-miles.

Altogether, a fine record for a railway working in as difficult a terrain as can be found in America.

Yours faithfully,

R. BELL

Clacton-on-Sea

The Scrap Heap

Vigilantes

After an appeal by the Stationmaster of Hatfield, British Railways, Eastern Region, young train-spotters have been watching railway lines in the district to detect hooligans who have wrecked coaches and put stone slabs on the rails.

Virile

Strongbow, one of the British Railways, Western Region, express diesel-hydraulic locomotives, named after warships, has a namesake in Bulmer's strong cider, particularly recommended for he-men, which was named after the original Strongbow, a medieval warrior.

Let or hindrance

I corresponded with British Railways for six months about a cottage I wished to rent. After agreeing to terms and repairs I was informed by another department that only a railway employee could rent the cottage. Three weeks later they had it demolished.—*From "The Evening News and Star," August* 11.

Home-seeker

A railway cat at Umtali, Rhodesia Railways, recently celebrated her adoption by the staff of the locomotive sheds by giving birth to triplets. In search of the ideal home, she took her family to the top of the traction motor of a D.E.2 locomotive. Still unsatisfied, she moved under the cab floor-boards of a Davenport diesel, from which she was quickly rescued. She then decided to cross the tracks and live in the erecting shop, where she established her residence in the steam-chest lagging of a locomotive under repair. Only after the tank had been replaced was the family discovered, and the tank had to be removed again to get the cat and kittens out. Now, to everyone's relief, the family is back in its original running shed home.

The Westerham Flyer

The Westerham-Dunton Green line of British Railways, Southern Region, which the Ministry of Transport proposes to close in September, was 80 years last month. One of the leading promoters of the line was William Tipping, the squire in 1881, described as "tall, with a bald head and grey curls, whiskers and a Newgate frill, walking about wearing a square-topped hard felt hat." He came originally from Liverpool, and never forgot the childhood thrill of watching the construction of the Liverpool to Manchester Railway. The two passenger coaches in use now for the

Open Day at Eastleigh

11-minute trip still carry the Southern Railway monogram within. One is a compartmented, corridor coach—necessary, since the guard both collects and issues tickets in addition to performing his other duties. The other has a central gangway, and what can only be described as an entrance hall, complete with coconut doormats. An exhortation to "Travel by Golden Arrow" seems somehow anachronistic. Apter in the context is a framed reproduction of a Kentish oast-house, which has been upside down for as long as anyone can remember.—*Condensed from "The Times," August* 11.

Prompt action

Recently a signalman and a porter employed at Looe, British Railways, Western Region, stopped a passenger train from colliding with a wrecked car on the Liskeard–Looe line in Cornwall. The car, carrying five people, had fallen 30 ft. on to the track after crashing through a fence. The signalman put down detonators while the porter ran towards the train waving his arms. The engine driver stopped the train within 30 yds. of the car.

What is "personal luggage"?

Fifty years ago, in August, 1911, an English judge gave a ruling which was interpreted in the daily press as meaning that a typewriter being carried on the railway for business could not be regarded as personal luggage. In fact, this went beyond the terms of the ruling, and was an application of the particular to the general. The action in question was brought unsuccessfully by a firm of solicitors against the Great Eastern Railway, claiming a refund of 4s., the sum paid under protest by one of their clerks for the carriage of a typewriter from London to King's Lynn. Judge Woodfall decided that the plaintiffs had no case because the contract for the railway ticket was made in the ordinary way by the clerk without any intimation to the railway company that he was the plaintiffs' agent.

Open day at Eastleigh

Eastleigh Works, in the Southern Region of British Railways, was open to visitors on August 9, and as always attracted many hundreds of young train spotters. Among other attractions, they were able to see steam and electric locomotives being overhauled and to get a close-up view of the footplates.

In transit

Fifteen hungry, rain-soaked Girl Guides squelched with anger against British Railways last night at the start of a week's holiday in a North Wales beauty spot. The girls had spent the day borrowing tents, blankets, and clothing in a rainstorm. For somewhere along the line their tents and luggage were lost.—*From the "Daily Express," August* 14.

Chilly joke

Ivan Semeonov, Soviet cartoonist and art editor of the Russian magazine *Krokodil*, recently visited the United Kingdom. During the course of his tour he travelled by train from Scotland to London, and one feature of his journey intrigued him in particular. He is reported to have said: "I tried the water taps on the train, and the hot one was cold. So was the cold one. I have been pondering whether this is a typical piece of British humour."

Inconvenience

A holiday excursion train made up of non-corridor coaches with no toilet facilities travelled from Llandudno to Stafford, 100 miles away, without halting. When the train stopped at Stafford passengers rushed out and queues 50 yards long formed on the platform. A British Railways spokesman stated that every available coach had been put into service and that Stafford was the first available stopping point. In explanation of the congestion at Stafford, he added that the station there was being completely reconstructed and facilities were not as good as they should have been.

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

DENMARK

The Langelandsbanen to be closed

The island of Langeland in Denmark is at present connected with Funen by a ferry service carrying railway and road vehicles; the railway wagons are moved forward on Langeland over the privately-owned Langelandsbanen. Now a bridge to that island is being constructed and nearly complete, but it will carry only road traffic and no railway, and in consequence the Langelandsbanen will have to close down. It has a route-mileage of 21 and owns one steam locomotive, four diesel railcars, three passenger coaches and 29 wagons. It carries only 400 tons of goods and 193,700 passengers annually.

SWEDEN

Line reopened

The Östra Södermanlands Järnväg—an early railway which has been closed for some time—has been reopened by the Swedish Railway Preservation Society with the approval of the President of the Swedish State Railways. It will be open only during the summer season for the benefit of tourists and rail fans.

VICTORIA

Standard-gauge C.T.C. progress

The first equipment for centralised traffic control of trains on the new Melbourne–Albury standard-gauge line has been installed in recent weeks, including a number of signals, relay-boxes, and the foundations for several level-crossing boom-barriers and flashing lights.

Erection of poles for power lines, the C.T.C. lines, has reached 60 miles. More than 1,250 men are engaged on this work, 515 of whom are accommodated in departmental camps, the largest, for 146 men, being at Seymour.

PHILIPPINES

Manila Railroad Cagayan Valley extension

Construction began on the extension of the Manila Railroad to the Cagayan Valley in northern Luzon on July 15 at four points: at San Jose in Nueva Ecija, the present northernmost point of the branch being extended; at Tuguegarao, the future terminal at the head of the valley, and at both ends of a projected tunnel through the Caraballo Mountains. The extension to this rich area has been hoped for since the early days of the American occupation of the Philippines. In fact, American military engineers the turn of the century made preliminary surveys of the route. The Cagayan Valley covers some 6½ million acres in a huge pocket formed by the Cordillera, Sierra Madre and Caraballo ranges, and is rich in natural resources of minerals, water power and a fertile soil. Lack of adequate transport has been its main problem.

PERU

Line to be built and equipped by Japanese

Two decrees dated May 20 in Peru have allocated 12 million soles for the Huadquiña–Quillabamba railway, which is being built by Mitsubishi of Japan. This undertaking will also deliver 62 locomotives, and a number of passenger coaches and freight wagons for use on the railway, under a contract signed between the company and the Peruvian Government.

WESTERN AUSTRALIA

Prospects of the standard gauge

So vitally urgent is the fulfilment of the £80-million Railway-Steelworks agreement considered, that the State Government is preparing to cut the planning and construction time of the 3-ft. 6-in.–4-ft. 8½-in. gauge main line conversion from 6½ to 4½ years.

Serial programme of construction

The programme envisages the standard-gauge construction work being undertaken in three phases; (1) Kwinana-East Northam—this by securing the elimination of the costly working of the difficult Midland Junction-Northam section will save £600,000 annually; (2) the new branch from Southern Cross to the iron-ore deposits at Koolyanobbing (and presumably the East Northam-Southern Cross section to allow ore to be carried to (2); and (3) the remainder of the line from Southern Cross to Kalgoorlie there to link up with the Commonwealth Railway standard-gauge line.

Double-heading eliminated

The easier gradients on the new alignment are expected to eliminate the double-heading of 1,500-ton goods trains on the most difficult section, and to increase maximum passenger-train speeds from 45 to 70 m.p.h. The time for passenger trains between Perth and Kalgoorlie will be reduced from 14 hr. to 10 hr. Goods-train speed will rise from 35 to 50 m.p.h. maxima and times will be only 16 instead of 31 hr.

Signalling and control

An ultra-modern signalling system—possibly C.T.C.—is envisaged at an estimated cost of £2½ million.

DIESEL-HYDRAULIC STOCK ON VICTORIAN RAILWAYS

"W" Class diesel-hydraulic shunting locomotive on Victorian Government Railways

IRON-ORE RAILWAY and port—I

Construction of 193 miles of track in difficult country and in severe weather conditions

ON December 10 last one of the few really large present-day railway construction undertakings in the Western Hemisphere was completed. To serve its great hematite deposits near Lac Jeannine, some 150 miles north of the St. Lawrence estuary, the Quebec Cartier Mining Company—a subsidiary of the United States Steel Corporation—has built this costly line. It is part of the £70-million project required to develop the 30 to 35 per cent ore deposits in isolated terrain and is the only outlet for the concentrate. The annual output of ore is estimated at 20 million tons. Involved in the scheme are a deep water harbour at Port Cartier, Shelter Bay, on the Gulf of St. Lawrence and, near the mine, a concentrator and a hydro-electric plant, in addition to the railway and the towns necessary at its terminals.

Aerial survey and mapping

A wide area around the deposits and along the general route of the railway was subject to intensive aerial reconnaissance, as a result of which 13 possible routes were selected for closer investigation. Aided by Canadian Aero, 1 in.-to-a-mile air maps were made, from which the alternative routes were reduced to three and the final route was selected by Messrs. Tippets Abbett McCarthy & Sutton, railway consulting engineers of New York.

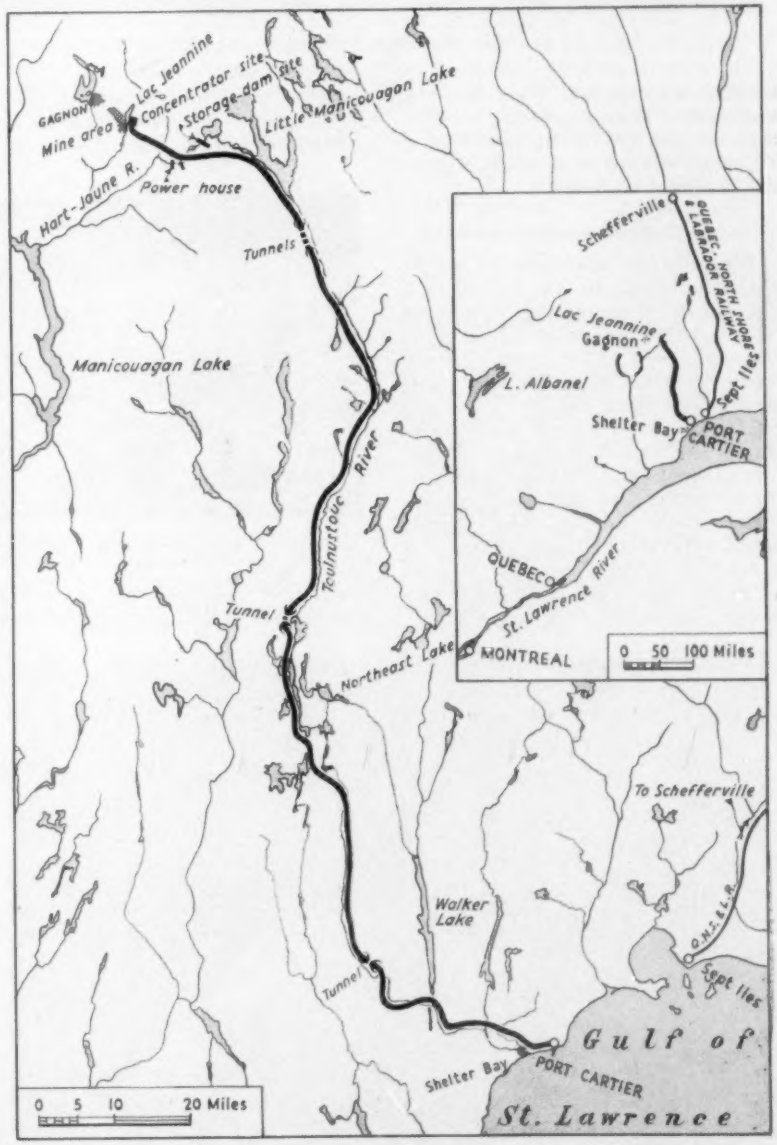
The topography is such that the line as built is 193 miles long, whereas the distance as the crow flies between its terminals is only 141 miles. In fact, nearly half the alignment is curved, and about half of it is bedded on rock. This curvature—involving normally the sharpest curve of about 16-ch. rad., though there are a few of 12½-ch.—made it possible to secure a ruling gradient against loaded ore-trains of 1-in-250, compensated for curvature. The ruling gradient in the other direction, faced by empty wagon trains, is about 1-in-74.

These gradients are required to climb from sea level to cross two mountain ranges, one with a rail-summit of over 3,000 ft. altitude. These facts give some idea of the difficulties encountered in the construction, which involved five tunnels.

Though single-line throughout—except at six crossing loops—this railway is of a high standard of construction and equipment. It is laid with 132-lb. rails, mostly welded in 78-ft. lengths, on hardwood 8 ft. 6 in. x 7 in. x 9 in. sleepers. Bedding ballast is of pit-run gravel, over which is spread from 8-in. to 12-in. crushed gravel.

The crossing loops are laid with 1-in-16 turnouts and at each there is a lay-by dead end. The loops accommodate trains consisting of 125 ore wagons of 90-ton capacity, weighing about 16,000 tons loaded.

In construction, also, the standard set was high. It was laid down that material in the formation subject to deterioration in temperatures of 50 deg. and more below zero, must be replaced by rock fill. Also that embankments must be of rock placed in 2-ft. layers with 8 in. of sand and gravel as top surface, the whole to be



Route of railway constructed by the Quebec Cartier Mining Company

B*

Marion-type 101M. excavators working against rock wall

thoroughly compacted. Formation level was nowhere allowed to be less than 6 ft. above the highest known water level in the neighbourhood. It is stated that about half the line is on rock.

Range of temperature

Topographical difficulties were not the only ones facing the construction staff. The range of air temperatures varied from 50 deg. below zero in winter to nearly 100 deg. above in the summer months Supply problems during the long winter season were most difficult. The only road in the whole area was a track from Shelter Bay to a lumber camp. Equipment, supplies, and parts had to be flown in, or brought by ship from Atlantic ports, unlike Montreal and Quebec, which were icebound, and landed at a temporary harbour at Port Cartier where the water is salt and could be kept open. The various work sites were supplied by plane to air strips built along the line and by a service-road as and when constructed from railhead. A pioneer service road was pushed through to the mine as soon as the alignment had been located, and was itself a major construction job.

The main contract for the railway construction was let in September, 1958, to a combine of two companies, C. A. Pitts Construction (Quebec), Limited, and Foley Brothers (Canada), Limited, and known as Pitts-Foley. This combine, the consulting engineers, and the Quebec Cartier Mining Company jointly established a base camp at Mile 6, complete with workshops, stores, living quarters, offices, a central radio station, and an 18-bed hospital. Lineside camps were also established as work advanced from Port Cartier.

Construction throughout the year

Work went on all the year round, much of the time on a two-shift basis. The maximum labour employed by the contractor was 2,500, and the consultants had a staff of 325. The greater part of the work was rock excavation in cuttings and tunnels, the spoil being carried to form neighbouring embankments. The total quantity of excavation was some 14 million cu. yd., about half of it in rock. For blasting, the holes were drilled by caterpillar portable drills and jackhammers and were up to 2½ in. in dia., spaced in various patterns. Delay caps were used and each shot usually broke up the rock in small pieces. These were loaded into high-capacity rear-dump trucks by caterpillar shovels. Most of the material went into neighbouring fills.

Part of the less difficult terrain through which the line passes

Drilling for excavation by blasting on precipitous mountainside

The tunnels of various lengths up to 1,430 ft. were all in solid rock, except one where unsound material in the roof necessitated permanent steel lining. There was also crumbling rock in one of the portals in a neighbouring tunnel that had to be stabilised with anchor bolts and steel mesh. The fills were compacted to 90 per cent of the standard maximum density below 6 ft., and 93 per cent. above 6 ft. from the top. The softer soil in the cuttings is mostly silt and sand heavily water-laden, difficult to handle and almost impossible to dry out. It was replaced for filling by more suitable material

WHEEL AND AXLE MACHINING at Durgapur Steelworks, India

Special-purpose machine tools with fully-mechanised work handling and conveyor disposal of swarf

THE plant at Durgapur Steelworks, India, for the machining and assembly of 45,000 wheel sets annually is, in conjunction with the wheel and axle forge, a completely self-contained unit. In the shop layout full advantage has been taken of the available space to obtain a converging work flow from the forged-wheel and forged-axle stores to the finished wheel-set assembly section.

As a member of the ISCON consortium, Davy & United Engineering Co. Ltd. is responsible for the complete plant, with Craven Bros. (Manchester) Ltd. as the main sub-contractors for the layout and supply of all machine tools for wheel and axle machining, and for the ancillary departments. Except where otherwise stated the machine tools have been designed and built by Cravens for this project.

Wheel machining

Wheel machining is carried out in four stages by a battery of special-purpose machines for each stage. Stage 1 machines are installed in a line facing the forged-wheel store and Stage 4 machines in a line adjacent to the finished-wheel store. This cross-flow between the stages of the work in progress reduces handling to a minimum, and the battery arrangement of the machines in each line maintains flexibility without reduction in the maximum loading of the machines in operation.

Wheels are delivered to the machine loading tables by gravity roller conveyors and transfer cars, and handled on each machine by electrically-operated swing-jib cranes. Motor-driven turntables are provided on some of the transfer cars for turning wheels over between the machining stages. Swarf is removed from the machines by a travelling conveyor system below floor level. This conveyor discharges the swarf directly into rail wagons outside the machine shop.

Vertical wheel-turning mills

For the first-stage machining a line of Craven vertical wheel-turning mills is used for machining the outside of the wheel blank. At this stage the rim is faced and turned on the inside, the boss faced and skimmed on the outside, and the rim and boss blended into the web. A recess is turned in the face of the rim for gripping the blank on the next operation. Mounted on the machine upright is a heavy cross-slide which carries two separate balanced vertical tool slides. Horizontal feeds to the saddle and vertical feeds to the tool slides of 8·5 to 68 mm. per min. are obtained from a ½-h.p. variable-speed motor and gearbox. A further motor on the gearbox provides quick power traverse in each direction; the changeover from feed to quick traverse drive is made by push-button controlled magnetic clutches. The rotary table, which runs on a vee-section track, is fitted with four independent clamping jaws which may be adjusted to take wheels from 28 in. to 44 in. tread dia. It is driven through vee-belts and bevel gears by a 40-h.p. variable-speed motor and has a speed range of 10 to 40 r.p.m.

Second-stage machining is carried out on semi-automatic vertical boring and turning mills. For these operations the wheel is turned over and gripped by the table jaws in the recess machined on Stage 1. The machining operations on Stage 2 are facing the inner side of boss and rim, turning boss diameter and blending to the web, rough-and-finish profiling the tread and flange and rough-boring the boss. The last three operations are performed simultaneously.

Single-column machines

The machine is of heavy single-column type with a fixed cross-slide carrying an independently-driven vertical boring head and a single turning saddle which has two vertical rams with tool-holders for operation on the boss and rim. Right-hand and left-hand side-heads on the upright have electrical profile-copying equipment for tracing the tread and flange form; the right-hand head is used for roughing and the left-hand head for finishing.

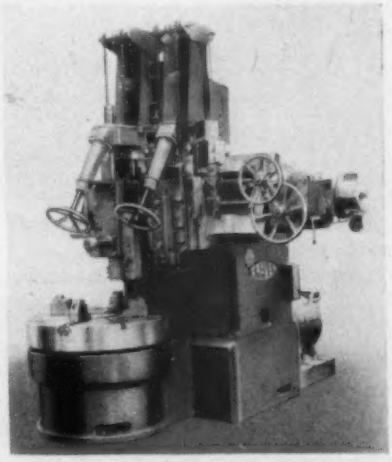
The expanding chuck jaws on the work table are operated by dual-slave hydraulic motors supplied by a twin pump unit. A 60-h.p. variable-speed motor drives the table through vee-belts and reduction gears, giving a range of table speeds from 10 to 40 r.p.m.

The boring head is moved transversely from its central working position on the cross-slide by a hydraulic cylinder. Driven by a 17½-h.p. variable-speed motor, the vertical spindle revolves in the opposite direction to the table at speeds ranging from 60 to 120 r.p.m. A single push-button switch begins an automatic sequence of spindle movements, starting with rapid approach of the two boring tools to the boss, commencement of spindle rotation, automatic change to cutting feed rate, quick return to starting position after boring, and final stoppage of spindle rotation.

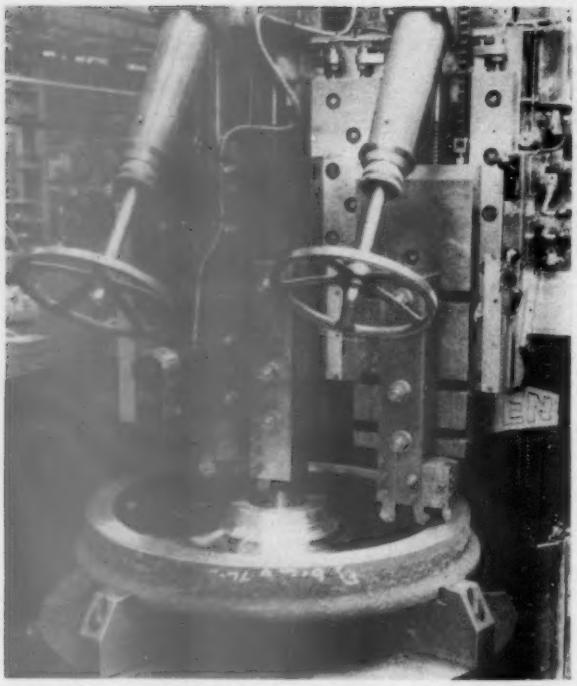
Profiling

The side-heads used for profiling have a vertical screw traverse on the upright and a horizontal ram with tool-holder and screw-operated traverse. Each traverse is operated by a separate motor. When profiling, the two motors are controlled automatically in relation to each other by a sensitive stylus attached to the ram and a template mounted on the cross-slide. The cycle is as follows:—(1) start with a fast approach, (2) change to feed rate for profiling when the stylus makes contact with the template, and (3) tool withdrawal on completion of the cut. The work of roughing and finishing proceeds simultaneously, the roughing cutter leading by approximately one inch. All push-button operating controls are grouped in a control desk, which also incorporates warning lights and dial-type indicators showing the machine movements.

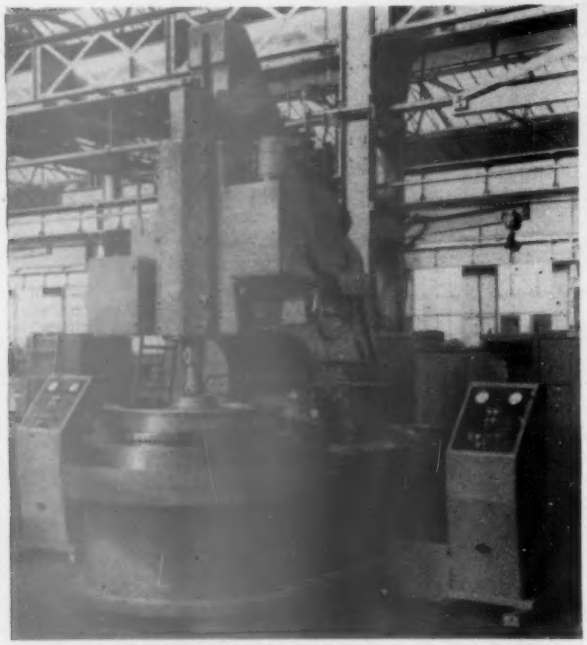
Sprag holes in the wheel webs are bored on stage three by two dual-spindle horizontal trepanning and drilling machines. The two spindles have parallel axes, with horizontal adjustment to suit different pitch-circle diameters. The trepanning heads are rapidly advanced to the wheel blank, fed through the web



Vertical wheel-turning mill

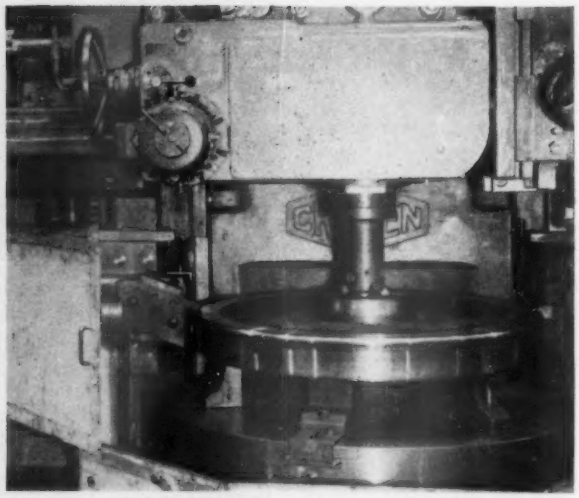


(*Above*): *facing and turning wheel-blank*

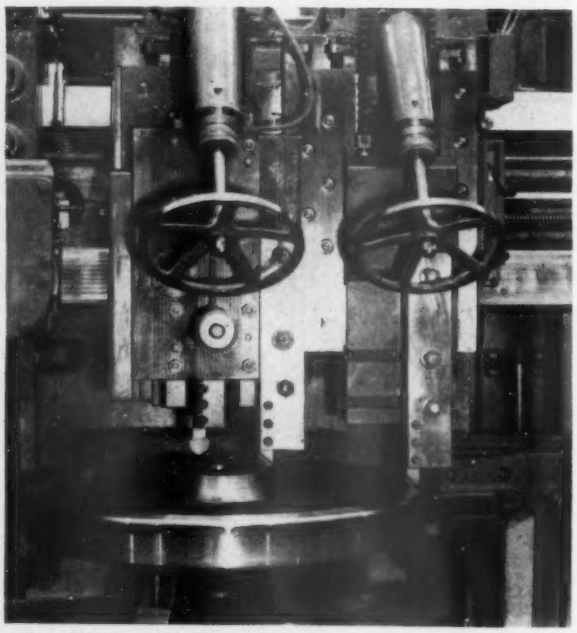


(*Above*): *finish-boring and reaming wheels*

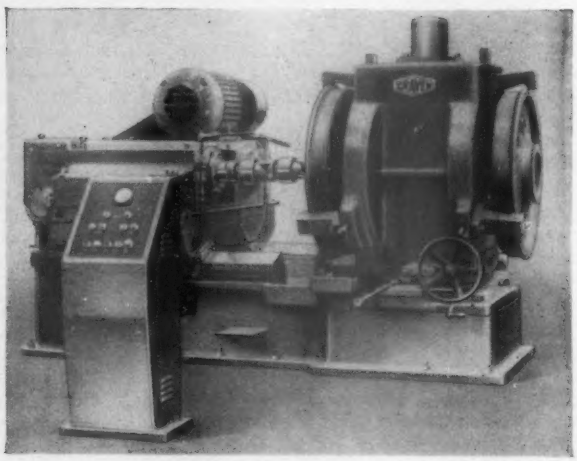
(*Below*): *double-head machine for axle-centring and recessing*



(*Above*): *rough-boring wheel boss*



(*Above*): *cutters for flange-profiling*



(*Above*): *trepanning wheel webs*

and quickly withdrawn in a hydraulically-operated sequence of trepanning headstock movements. A two-position turret-type work holding fixture enables one wheel to be machined while a second wheel is being loaded into position. The turret is unlocked, and relocked after indexing, by hydraulic power.

The final stage of the wheel machining is that of finish-boring. This operation is carried out on a bank of six Craven semi-automatic vertical boring machines. The wheel is carried on a 54-in. dia. table and gripped on the tread by four independent jaws. Dial-gauge fixtures facilitate accurate location. The interchangeable tool-bar carries a single-point semi-finish boring tool, a floating-reamer blade, and a small radius-form tool, spaced so that they may operate in succession during a single vertical feed traverse of the ram.

Sequence of operations

The sequence of operations is controlled by dogs adjustably mounted on a graduated disc; engagement of feed or quick traverse is by magnetic clutches. Operation of the "start cycle" push-button causes a quick traverse downward of the ram until the boring tool is near the wheel boss; the traverse then changes automatically to feed rate. When the boring tool has passed through the boss, the table speed is automatically reduced and the feed rate increased for the reaming operation. On completion of the reaming, the power feed to the ram is tripped, and further traverse to bring the radiusing tool into operation is effected by hand. The total available vertical travel of the ram is 36 in.

The table rotates on a vee-section circular track and is driven by a 10-h.p. variable-speed motor through bevel-and-spur gearing. Speeds range from 13·3 to 40 r.p.m. Feeds to the ram are by a variable-speed motor and range from 0·625 to 4 in. per min. Quick power traverse is by a separate motor. The tool equipment is suitable for bores from 5-8 in. in diameter. From the finish-boring machines the wheels are transported on gravity roller conveyors into the finished-wheel store where they are inspected and graded.

Transfer cars

The transfer cars used for transporting wheels between the various conveyors are rider-controlled electrically-powered machines mounted on rails. Each car is designed to carry one wheel, and has a maximum speed of 300 ft. per min. in each direction. Three notch positions are provided on the drum controller, and the hydraulic brakes are foot-pedal operated. The turn-over jig, fitted on some of the cars, is electrically operated and is arranged to turn the wheel-blank through 180 degrees. To facilitate the wheel loading from the machines on to the conveyor a power-operated tilting table is used. Wheels are lowered vertically by the machine crane against the stops of an inclined roller-top table. The table is then swung to the horizontal and the wheels roll off on to the conveyor.

Machine tools for dealing with the axles are laid out in a production line which makes provision for flexibility when dealing with axles of varying gauges and different types of journals. All the machines are located on each side of a central track which carries three electrically-driven transfer cars. Each machine has ingoing and outgoing storage tables, fitted with pneumatically-operated stops. The transfer cars have a tilting table for rolling the axles on and off the machine tables.

After shot-blasting the forgings are cut to length on a Russell duplex Hydrofeed cold saw. This is a semi-automatic double-head machine which cuts both ends simultaneously. The hydraulic feed is interlocked with the hydraulic clamping of the vee-blocks. A balanced-feed circuit ensures a controlled rate of feed, which prevents the saw pulling into the work.

Centring and end-recessing

Cutting to length is followed by centring and end-recessing in a Craven double-head machine in which the axles are located and gripped by two hydraulically operated self-centring clamps. Left- and right-hand cutter heads operate simultaneously on both ends of the axle. Each head has two side-by-side spindles, one for drilling and the other for forming the conical centre and flange recess with a combination cutter. When the axle has been gripped, the drilling, indexing, and recessing follow in an automatic sequence of hydraulically-operated movements.

Each spindle is driven by a 5-h.p. motor, driving through worm gears to give a speed of 376 r.p.m. for drilling and 74 r.p.m. for recessing. Hydraulically-operated cross-travel of the head on an intermediate slide brings either spindle into line with the axle as required. All movements in the automatic cycle, initiated by a push-button, are controlled by electrical trips actuating solenoid-operated hydraulic equipment valves.

The axles are rough-turned on the journals or roller-bearing seatings, and on the wheel seats, in two Craven semi-automatic single-end axle lathes. Each machine has a fixed headstock, an adjustable saddle carrying independently-operated front and rear tool slides, and a tailstock with octagonal-section sliding barrel and revolving centre. The headstock spindle is driven by a 75-h.p. variable-speed motor through multiple vee-belts and helical gearing, giving a stepless spindle-speed range of from 175 to 350 r.p.m.

The axle is supported between centres and driven by a self-centring chuck. Machining operations are performed at the tailstock end only; the axle is reversed for turning the other end. Loading operations are facilitated by a hydraulically adjusted vee-type axle support mounted on the bed adjacent to the headstock and a support on the saddle. For turning plain journal axles the front slide carries tools for turning the parallel portions at a single longitudinal traverse. The rear rest carries two form tools for the radii. Separate hydraulic cylinders actuate the tool slides and, on completion of the automatic cycle, all tools are withdrawn and the machine stopped. The two-shear bed is arranged to allow the cuttings to fall through to a swarf conveyor, and the tool slides are set at an angle to assist swarf removal.

Waist-turning

After rough-turning, some axles pass to a bank of Craven copying lathes for waist-turning. Each lathe has a fixed headstock, two saddles equipped for hydraulic copying, and a tailstock with hydraulically - operated sliding barrel. Cutting takes place simultaneously from both ends of the waist toward the centre, where a small overlap of cut is allowed. Power operation of the feed is by means of variable-speed motors built into each saddle apron. The hydraulic copying units are built into the rear of the saddles and operate through tracer heads from a single master-copy bar held between poppet heads mounted at the rear of the bed. In operation, the axles are lifted from a stacking table and lowered into line with the machine centres by jib crane. Movement of a control lever advances the hydraulic tailstock barrel to support the axle between centres and to push it home into the driving chuck.

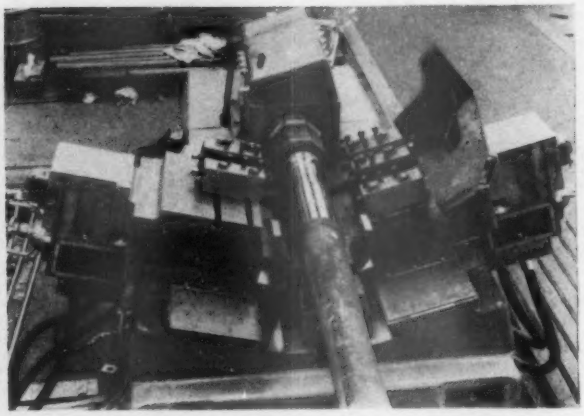
Finish-turning

Finish-turning operations on the journals, wheel-seats and axle-ends are performed on three No. 25 x 108 Dean, Smith & Grace lathes, each with a single saddle and hydraulic copying equipment. Machining is carried out mainly at a single setting of the axle, with axle reversal for the completion of the radiusing and facing of one end. The gearbox provides for a range of 48 feeds and for automatic engagement of half-feed rate when profiling the radii on the journals. The headstock is driven by a 22½-h.p. a.c. motor, at spindle speeds ranging from 7·4 to 600 r.p.m. Hydraulic actuation is provided for the tailstock.

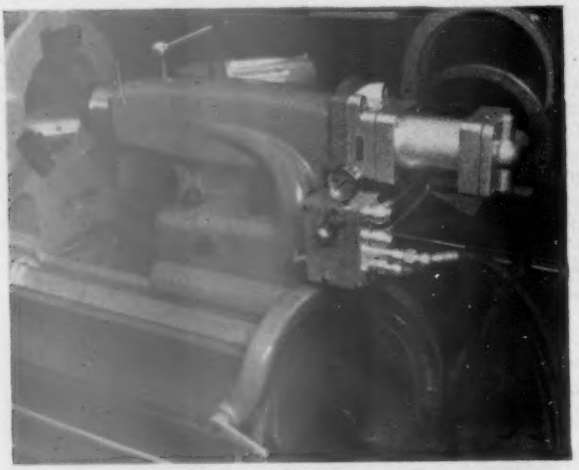
Plain bearing axles are ground on the wheel seats and roller-bearing axles on the wheel seats and journals. Grinding operations are carried out on Lidkoping centreless grinders, using a single plunge cut.

All journals of plain-bearing axles are finished on a single-end axle burnishing lathe. The axle is supported between hydraulically-operated centres and burnished by two horizontally-opposed burn-

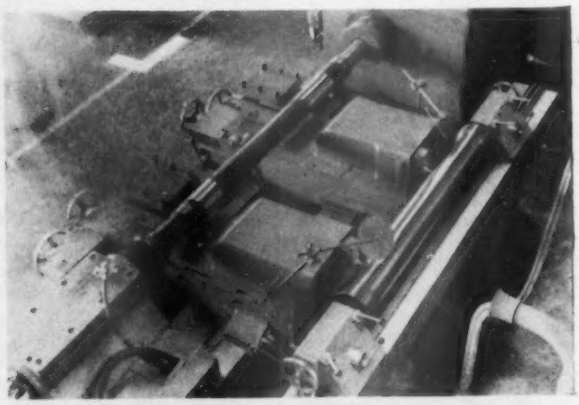
(*Right*): *rough-turning journals and wheel-seats*

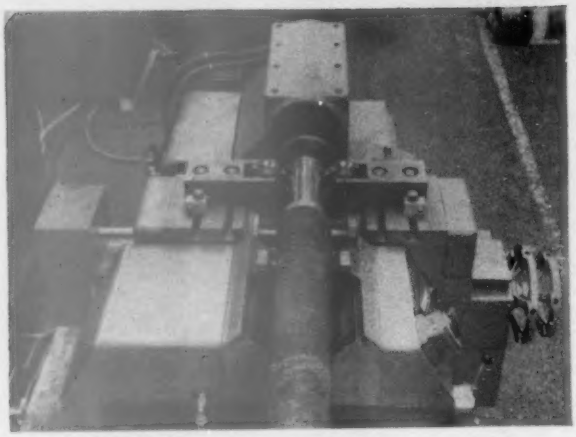


Hydraulic tailstock on finish-turning lathe

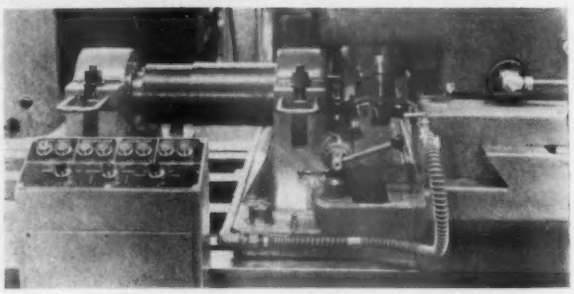


(*Below*): *waist-turning on copying lathe*

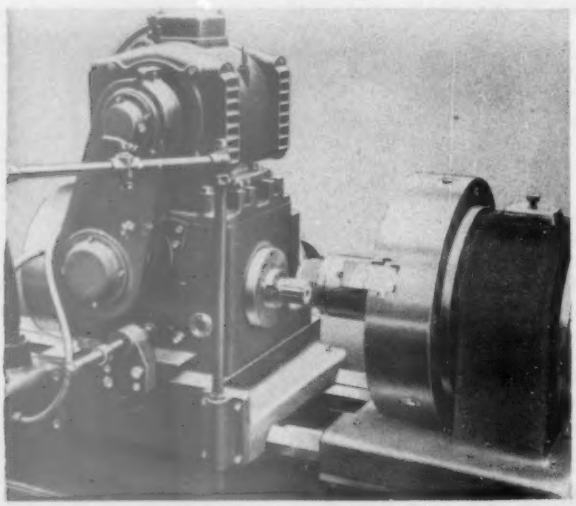




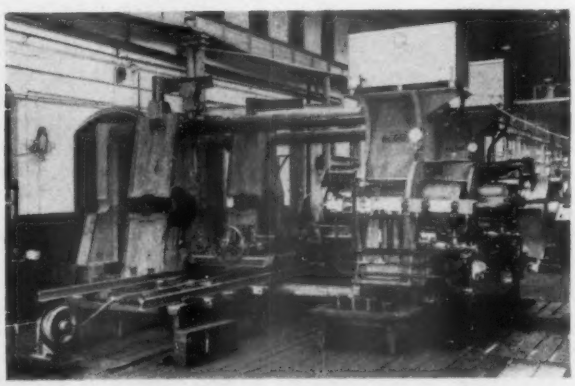
(*Above*): *burnishing plain bearing journals*



(*Above*): *slot-milling roller-bearing journals*



Thread-milling axle ends



(*Right*): *Tangye hydraulic wheel press*

ishing rollers. The rollers are brought into contact with the journal by hand-operated slides and a balanced pressure is then applied hydraulically to the rollers. This pressure is shown in tons on a gauge on the saddle. When the axle is loaded into the machine, the hydraulic tailstock is used to push the work forward into the chuck. The headstock is driven by a 10-h.p. variable-speed motor which, with epicyclic gearing, provides spindle speeds of 14·3 to 43 r.p.m. and 100 to 300 r.p.m.

This machine is also used for an intermediate cold-rolling operation on the wheel-seats of some axles to obtain a denser layer of material on the surface.

Machining roller-bearing axles

Machine operations on roller-bearing type axles include slotting across the end and thread milling. The machine for slot milling has a vertical spindle milling-head mounted at the end of a work bed, on which the axle is carried in two support clamps. On completion of the first slot, the clamps are eased and the axle rotated through 90 deg. to position for the second slot. After machining this, the axle is turned end-for-end in the machine. Hydraulic power feeds and hydraulic clamping are provided for the milling head, which is mounted on longitudinal and transverse slides. The sequence of quick approach of the cutter, control of the feed rate, and clamping of the slides, are all automatically controlled by cam-operated valves.

The cutting of the screw thread for the retaining collar is carried out on a single-end screw-thread milling machine having a fixed work-revolving headstock and a movable horizontal-spindle milling head. The full length of the thread is milled by a hob-like cutter during slow rotation of the axle. Lead is imparted to the thread by guide-screw–controlled axial movement of the headstock spindle. A swivel-type central support facilitates swinging the axle round for threading the opposite end.

Axles which require the machining of tapped holes in the end are handled on an Asquith single-end multi-spindle horizontal drilling and tapping machine. The axle is clamped to a swivelling table, so that one end faces a four-spindle drilling head. Rotary indexing of the head through 45 deg. enables eight equally spaced holes to be drilled; the axle is then swivelled through 180 deg. and the opposite end drilled. Indexing of the table through 25 deg. brings one end of the axle in line with a four-spindle tapping head. Further indexing of the table and head brings all the drilled holes in line for tapping.

Also used for the drilling and tapping of axle ends is an Asquith duplex machine in which two axles are clamped side by side on a swivelling table. At one end of the machine is a six-spindle drilling head and at the other end is a six-spindle tapping head. By indexing the table through 180 deg. both ends of the axle are drilled and tapped with one loading.

Wheel sets are assembled on a Tangye hydraulic wheel press of 300 tons capacity. This has a ram stroke of 25 in. Manhandling has been reduced to a minimum; the axles are rolled into position on a conveyor and the wheels threaded on at one side of the press, and assembled wheel sets rolled away on a ramp at the opposite side. Wheels are positioned for pressing by a pneumatic hoist. Fast approach and retraction speeds are provided on the hydraulic ram and the use of gauge blocks largely eliminates measuring. The press is also arranged for wheel removal from axles.

At the right-hand end is a stationary cross-head used to house the hydraulic ram, and at the opposite end is a stationary backplate. Between these members, which are connected by two steel tie-rods, is a movable headstock. This is positioned by a ratchet mechanism to adjust the gap according to the gauge of the wheel set. The 1½-ton pneumatic hoist, with a ram lift of 11½ in., is mounted on a four-wheel bogie moving on rails between the headstocks. An auxiliary trolley is mounted on this for transverse positioning.

Hydraulic pressure is supplied by an electrically-driven two-stage Towler pumping unit, incorporating a 150 lb. per sq. in. vane pump for fast approach and retraction, and a 4,480 lb. per sq. in. axial pump for pressing. A continuous record of the ram pressure is taken on a Budenberg autographic recorder. Oil cooling is by a Serck heat exchanger connected to the mains water supply.

Wheel sets for carriage stock

Wheel sets required for carriage stock are balanced on an Avery electro-dynamic balancing machine. With this machine a relatively unskilled operator can determine quickly and accurately the position and amount of correction required in any unbalanced wheelset. Mounted on roller bearings which are free to move transversely, the wheel set is rotated at 600 r.p.m. On the instrument panel of the machine is a centre-zero wattmeter, the needle of which is displaced by out-of-balance forces in the wheels. The amount of control-knob rotation required to zero the wattmeter is shown on graduated dials and this indicates to the operator the position and amount of out-of-balance correction required. During the balancing operation weights are secured in drilled holes and the weights required for balance are then permanently secured by electrically heated rivets.

Iron-ore railway and port

(*Concluded from page* 186)

from borrowpits, often in long lead to the fill. To counter the extreme cold the diesel shovels, dump trucks, scrapers and scraper-tractors were fitted with Universal heaters and 24-V. starters.

The spreading was done with the self-propelled and tractor-hauled scrapers, and compacting was effected with grid-rollers drawn by caterpillar tractors. For catchwater drainage above cuttings 6 in. corrugated metal drains were generally laid 6 ft. below the surface; so far, they have proved effective.

The line has no outstanding bridging. There are 17 steel and concrete bridges, some of the deck and others of the through type. A few are through-truss spans and trestle structures. The longest bridge is 880 ft. in length, and the highest is 120 ft. above bed level. There are also over 1,000 culverts, of from 3-ft. to 12-ft. dia. and of corrugated metal.

On the prepared formation the 132-lb. rails and hardwood sleepers were laid with fast-moving mechanical plant. The sleepers were spread with the aid of a caterpillar tractor fitted with a special log-handling front-end attachment; it dumped pallets of 20 sleepers at intervals along the line. Most of the rails used were in 78-ft. lengths each composed of two standard 39-ft. rails butt-welded together at the Port Cartier shops.

Modern track-laying methods

They were run out on rakes of flat wagons from which they were lifted, two at a time and carried forward by twin gantries straddling the track and with pneumatic-tyre wheels running on the berms. The crushed-gravel ballast was spaced over the whole track, and then the rails and sleepers were lifted and the ballast settling beneath them was vibrated by the modern "sled" method. Additional ballast was finally spread for packing and lining.

(*To be concluded*)

RECORDING RIDING QUALITIES

Canadian National Railways have converted a former buffet-sleeper-lounge car into a test car, to obtain data on the riding qualities of passenger and freight stock. The data collected, from vehicles to which it is electrically connected, is fed through appropriate instruments and recorded on tape. In addition to investigations into stress and strain the equipment is able to record axle-bearing temperatures, and variations in bearing loads due to track conditions. The tape is played back through an analogue computer, which analyses and correlates the information obtained.

RECONSTRUCTION OF CLEETHORPES STATION
British Railways, Eastern Region

Roof incorporating gabled structure makes the best use of natural light

On July 14, Mr. G. F. Fiennes, Line Traffic Manager, Great Northern Line, British Railways, Eastern Region, opened the rebuilt station at Cleethorpes.

Much of the former Cleethorpes Station interior has disappeared in the reconstruction, but the clock tower, a local landmark, has been retained, brightened by repair and repainting.

Improved facilities

The former station roof with its cast-iron columns has been replaced by a striking "gabled" structure, higher than its predecessor and specially designed to make the most of natural light. The old station had no booking hall, but one has been provided, together with ticket, left-luggage, and parcels offices. Facilities for the public have been greatly improved and extended. The waiting room is equipped with furniture specially designed for the Eastern Region. Other special features are the press-button infra-red heating and the room for nursing mothers, equipped with a comfortable settee, chairs, and even facilities for warming the babies' milk. The toilet facilities have been extended and the fittings renewed throughout.

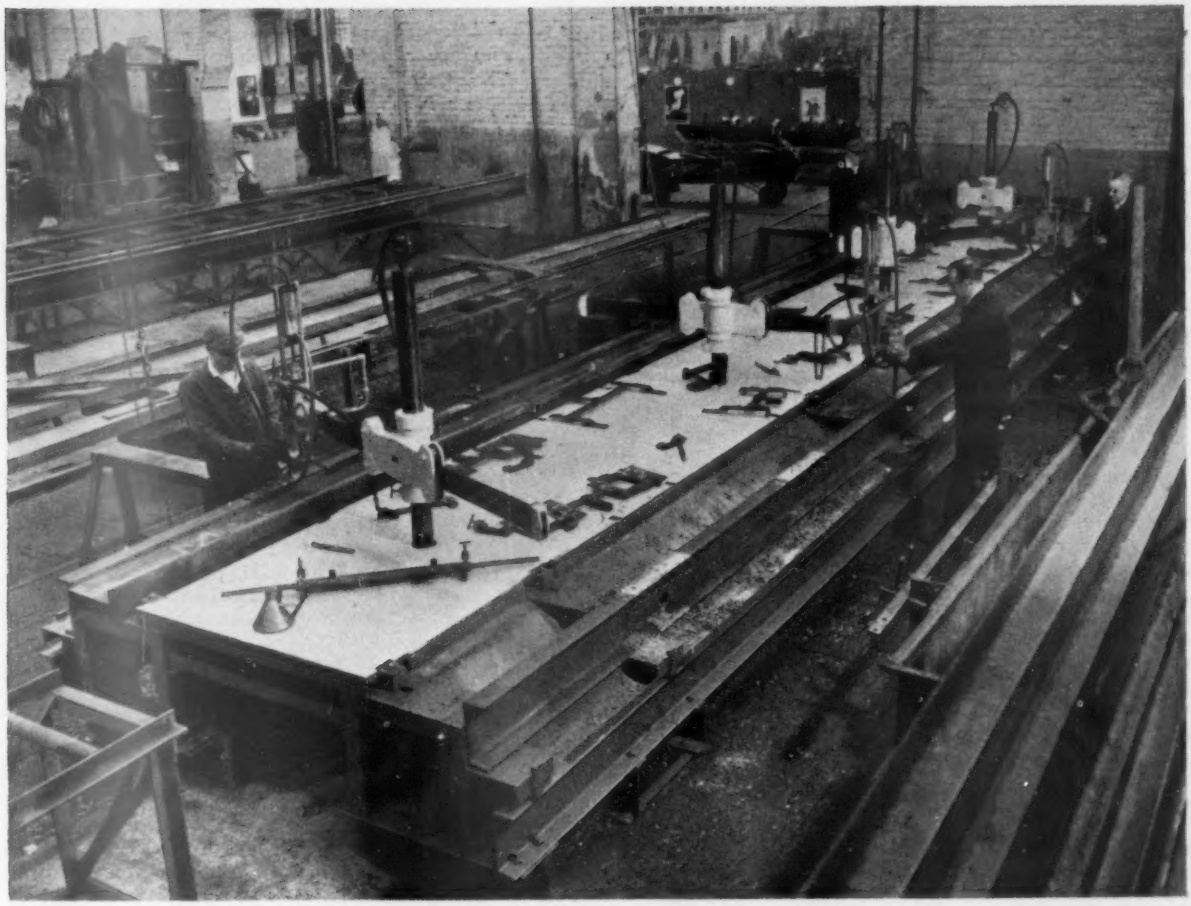
Extensive use of pinewood

All the brickwork is in 11-in. cavity construction. The concourse roof is of folded section and steel framed, with timber joists, bonded and finished with three-layer roofing felt. Three sides of the roof are carried by the station buildings and the side facing the platforms on steel stanchions. The roof soffit is of tongue-and-groove Parama pine with fluorescent lighting strips at the apex of each fold. A high level frieze of pine boarding carries small poster panels.

The roofs to the buildings are carried by steel and timber joists and are covered with boarding and finished with three-layer roofing felt. The booking hall walls are faced with Staffordshire-blue bricks and the floor is finished with quarry

Continued on page 194

Station entrance from approach walk



Note positioning of drill rigs. This enables 100 holes to be drilled in each member with minimum of handling

VAN PRODUCTION at Earlestown

General utility van with end doors capable of rapid conversion for parcels traffic

AT THE Earlestown Works on the London Midland Region of British Railways, production of a new type general utility van equipped with end-loading doors and capable of rapid conversion for use on parcels freight has recently been completed. Of these units 822 have been produced at the works.

Dimensions of vehicles

Each van measures 37 ft. over headstocks, and has a wheelbase of 19 ft. Unladen weight is 17 tons 6 cwt., and load capacity is 10 tons. The frame is of welded construction, and the side panels are of timber. Production was scheduled at the rate of 14 units a week. The vans were produced on two assembly lines after the completion of the main drilling and pressing of main-frame members. Each assembly line moved forward one station every 6 hr. 17 min.

The fabrication commenced with steel bars, "T" sections and angle sections being received by rail in the unloading bay and stored before use. The main preliminary fabrication was concerned with the forming of the two centre longitudes and two sole-bars which make up the main members of each van frame. The centre longitudes each consist of one "T" section and one angle section welded to form a "T" section. Each component section was first cut to length at a cutting station where two 20-in. dia. resin-bonded universal cut-off wheels were located at 40-ft. centres on the shop floor. After cutting, these sections were given a $\frac{3}{8}$-in. camber and were then set up in a jig, and assembled by intermittent, balanced, hand welding, the spaces between runs accommodating other welded sections at later stages.

When this stage was completed the sections were transferred to a main-drilling station where some 100 holes in the size range $\frac{15}{16}$-$\frac{5}{16}$ in. were drilled in each set of centre longitudes together with two additional holes of $1\frac{3}{8}$ in. for electrical conduits. The design of the equipment used to effect the drilling with the maximum efficiency was the result of considerable planning and experimentation by the staff at Earlestown, in conjunction with

engineers of the Consolidated Pneumatic Tool Co. Ltd. Because of the length of components to be handled, it was apparent that to carry out the work using a series of single-spindle drilling machines and a conveyorised feed for the workpiece would occupy some 130 ft. of shop space when a 40-ft. overhang at each end was considered. Furthermore, a substantial investment in machine tools would have been incurred without a sufficiently long term in use existing to warrant their purchase. The question of handling was also important if straight-line methods of production were to be maintained.

Drilling station

The drilling station evolved consisted of four Consolidated Pneumatic 327 drills mounted on sliding radial arms of 7-ft. length and fitted with 6-in. stroke and return pneumatic cylinders. The positioning of the drills in the rig was carefully worked out to ensure that every hole was reached. With this equipment handling problems were reduced to a minimum, two 10-cwt. chain-block hoists being sufficient for both loading and turning components to each side of the rig. The drills employed were taken from the normal stock of power tools used extensively in the works and throughout the entire production programme no stoppage was encountered due to mechanical failure of the tools.

On completion of the jig drilling the main members were taken in sets, each comprising two centre longitudes and two sole-bars to a welding manipulator where ten spacers were tack welded before receiving the centre longitude subassembly. At this stage the trunnions were also fitted. The following stages included the locating of the headstock plates and the fitting of the headstocks which were fabricated in an adjacent sub-assembly area, the fitting of buffer

Detail of drilling rig supplied by the Consolidated Pneumatic Tool Co. Ltd., showing constant-twist mechanism

trimmers, stiffening dogs, and the remainder of the cross bearers and sole-bars.

Use of frame manipulators

The completed sections were then transferred to frame manipulators where the remainder of the down-hand welding was completed. At this stage the brake suspension brackets were fitted, together with all hangers and box brackets.

This is turn was followed by the fitment of services, these comprising 2-in. vacuum pipes, steam-heating pipes and Gresham & Craven 18-in. vacuum cylinders. Later stages included the attachment of laminated 9-plate springs with rubber suspensions, and the fitting of a pulley-wheel dynamo. Considerable use was made of compressed air for assembly work throughout the shop, the step brackets for example being fitted by riveting with Consolidated Pneumatic 40 riveting hammers.

Completion of assembly

With the completed frames now mobile, the buffer assemblies, door-control gear and floor bearers were fitted, and the floor plates were welded. End-door frames and end-stiffening angles together with a controlled flap door were added. Each van roof was fabricated in an adjacent sub-assembly jig. Power tools were particularly extensively employed in the subsequent carriage assembly, the high-frequency electric " Hicycle " tools employed being powered from a 10-kW. frequency changer. The tools employed included screwdrivers for emplacing the roof lining, with self-tapping screws, timber drills, augers, and nut runners. Of particular note in this section was the use made of bench-mounted " Hicycle " 201 drills for drilling the aluminium capping and cover plates, and the body-side and roof rails. In this instance the drills were installed against a long wall so that 40 ft. was available on either side of the workpiece.

Considerable experience of power-tool operation at Earlestown is evidenced by the use of about 500 pneumatic and 389 " Hicycle " high-frequency electric drills throughout the works, the latter figure excluding a large number of screwdrivers, sanders, and so on. Many of the " Hicycle " tools currently in use were installed over 25 years ago, when the first installation was made.

Reconstruction of Cleethorpes Station

(*Concluded from page* 192)

tiles. The ticket office front has melaphone ticket windows and is fully glazed above counter level and faced with blue bricks below. The ticket office is equipped with Eastern Region standard-steel traffic-office equipment and a Flexiprinter ticket-issuing machine and Bolman ticket dispensers have been provided. Floors in the ticket office and waiting room are finished in vinyl tiles. The concourse floor has been resurfaced. A partly resurfaced external footpath, which has been lowered, gives access to the station and booking hall.

Modernised public address

The original public address system has been modernised, and loudspeakers provided to form an integral part of the reconstructed concourse. Loudspeakers now cover the concourse area, entrance, footway approach, roadway approach, and platform area.

The platforms are illuminated by light fittings mounted on 12-ft. concrete columns spaced 80 ft. apart. The concourse is lit by means of cold-cathode fittings mounted in the apexes of the roof, each apex having a continuous line of fittings 24 ft. in length.

Lighting of approach

The lighting of the approach road is effected by colour-corrected mercury-vapour lamps mounted on 15-ft. concrete columns.

The design of the rebuilt station was undertaken by Mr. H. H. Powell, Regional Architect, and the work carried out under the general direction of Mr. A. K. Terris, Chief Civil Engineer, Eastern Region. Telecommunications work was carried out under the direction of Mr. R. A. Green, Chief Signal & Telecommunications Engineer, and the lighting installation was designed under the direction of Mr. T. C. B. Miller, Chief Mechanical & Electrical Engineer, Eastern Region of British Railways.

Concourse from the east side

PERSONAL

British Transport Commission

MR. D. BEATTIE, Assistant Divisional Traffic Manager, London (Midland), British Railways, London Midland Region, who has been appointed Freight Services Survey Officer, British Transport Commission, was educated at Lincoln County School and began his career in the London & North Eastern Railway in 1936. He obtained experience

Mr. D. Beattie

at Lincoln Goods Station until 1940, when he became a Lieutenant in the R.N.V.R. and served in convoy escort work and in the Normandy landings. In 1946 he was appointed a Traffic Apprentice and trained at Darlington, Middlesbrough, Newcastle, and York. In 1950, he moved to the Development Section of the Commercial Superintendent's Office at Glasgow and, in 1951, was appointed Goods Agent, Shieldhall. In 1952 he became Cartage Assistant to the District Goods and District Passenger Superintendents, Glasgow, and in 1955 was appointed Assistant District Traffic Superintendent, Inverness. Mr. Beattie became Assistant District Commercial Manager, Derby, in 1956, District Commercial Officer, Norwich, in January, 1958, District Commercial Manager, Leicester, in 1959, and Assistant Divisional Traffic Manager, London (Midland), earlier this year.

COLONEL DONALD CAMERON OF LOCHIEL, Chairman of the Scottish Area Board, British Transport Commission, has been re-appointed a part-time Member of the Commission.

British Railways

The London Midland Region, British Railways, has announced the following appointments: MR. J. K. FIRTH to be Commercial Superintendent, Line Traffic Manager's Office, Crewe; MR. A. B. ARUNDALE to be Commercial Superintendent, Line Traffic Manager's Office, Derby; MR. C. P. MILLARD to be Commercial Superintendent, Line Traffic Manager's Office, Manchester; MR. S. B. LOVEGROVE to be Movement Superintendent, Line Traffic Manager's Office, Crewe; MR. G. J. ASTON to be Movement Superintendent, Line Traffic Manager's Office, Derby; MR. C. R. BENNETT to be Movement Superintendent, Line Traffic Manager's Office, Manchester; MR. L. P. LEWIS to be Finance Assistant, Line Traffic Manager's Office, Crewe; MR. P. D. M. INGS to be Finance Assistant, Line Traffic Manager's Office, Derby.

MR. P. J. FISHER, Line Traffic Officer (Operating), Crewe, British Railways, London Midland Region, who, as recorded in our August 4 issue, has been appointed Co-ordinating Officer, (Euston Station Reconstruction), began his railway career on the former London Midland & Scottish Railway in 1928. After gaining experience at various stations and in the staff office at Derby, he served on a shunting analysis committee for the Western Division, later becoming Assistant Signalmen's Inspector at Bangor. Appointment to a similar position at Willesden followed, after which Mr. Fisher became a Runner at Euston. He became Assistant District Controller, Peterborough, in 1936 and, two years later, moved to a similar position at Rugby. During the 1939-45 war he joined H.M. Forces and served in railway operating units. In 1945 he was appointed Assistant District Operating Manager, Liverpool, and, a year later, District Operating Manager, Rugby. In 1947, he became District Operating Manager, Liverpool (Lime Street). This position, was redesignated District Operating Superintendent, Liverpool (Lime Street) the following

Mr. P. J. Fisher

year. In 1954 he became Assistant (Freight) Services, Euston, and, in 1955, Modernisation Assistant to the Chief Operating Superintendent and Chief Commercial Manager. In 1957 he was appointed Divisional Operating Superintendent, Crewe, and later Line Traffic Officer (Operating), Crewe.

MR. A. M. Y. ROBB, District Operating Superintendent, Manchester (South), British

Mr. A. M. Y. Robb

Railways, London Midland Region, who, as recorded in our August 4 issue, has been appointed Co-ordinating Officer, (Birmingham Station Reconstruction), joined the railway service in the Goods Department at Aberdeen in 1926 and later became a Traffic Apprentice. Mr. Robb was Stationmaster at Laisterdyke and Yard Master at Frodingham before being appointed Assistant to the District Superintendent at Glasgow in 1943. Three years later he went to Aberdeen as Assistant District Traffic Superintendent, and, in 1950, he became Assistant District Operating Superintendent, Rotherham. In 1954 he was appointed to the position which he now vacates.

MR. L. S. CAMP, Assistant to the Chief Accountant, British Railways, Western Region, has retired.

MR. E. W. BIRCHLER, Assistant Rolling Stock Engineer, Ilford, British Railways, Eastern Region, has been appointed Assistant Electric Traction Engineer, Ilford.

MR. D. P. WILLIAMS, Senior Assistant to the Public Relations Officer, London Transport Executive, has been appointed Assistant Public Relations Officer, British Railways, Eastern Region.

MR. G. ELMITT, chief clerk, British Railways, London Midland & Scottish Railway

Savings Bank, Euston, has been appointed Secretary of the Bank.

MR. T. LITTLE, Relief Stationmaster, Newcastle District, British Railways, North Eastern Region, has been appointed Stationmaster, Heads Nook, also in charge of Wetheral.

MR. D. FREW, Chief Accountant, British Railways, Scottish Region, has retired.

London Transport Executive

MR. T. S. PICK, Chief Electrical Engineer, London Transport Executive is to retire. He is to be succeeded by MR. L. A. M. GINGER, Assistant Chief Electrical Engineer.

Mr. H. E. Styles

MR. H. E. STYLES, Superintendent of Laboratories, London Transport Executive, who has been appointed Director of Research, was educated at Strand School, Brixton, and Battersea Polytechnic where he graduated with first-class honours in chemistry. He joined the staff of the London General Omnibus Company laboratory, the forerunner of London Transport's present Research Laboratory, in September, 1927. In 1940 he became Assistant to the Chief Chemist and, later, Assistant to the Superintendent of Laboratories. Mr. Styles was appointed Superintendent of Laboratories in 1950, in charge of the Central Laboratory at Chiswick and three laboratories located at London Transport's Lots Road, Greenwich and Neasden electricity generating stations. As well as being a Fellow of the Royal Institute of Chemistry, the Royal Statistical Society and the Institute of Petroleum, Mr. Styles has been a member of the Institute of Metal Finishing from the time when he became responsible for full-scale development of the electro-deposition processes. Mr. Styles represents London Transport on the Standardisation Committee of the Institute of Petroleum, the Illumination Industry Standards Committee of the British Standards Institution and the National Illumination Committee of Great Britain. He is chairman of the sub-committee of the National Illumination Committee.

MR. A. G. COLLINGS, Assistant Superintendent of Laboratories (Chemist), London Transport Executive, who has been appointed Assistant Director of Research, was educated at the Stationers' Company's School

Mr. A. G. Collings

and at Birkbeck College, London. He gained his early experience in the laboratory of the Government Chemist and joined the London Passenger Transport Board in 1935 as an Assistant Chemist. He became a Senior Executive Assistant in 1950 and a Principal Scientific Assistant in 1955. In July, 1960, Mr. Collings was made an Officer of the Executive with the title of Assistant Superintendent of Laboratories (Chemist).

MR. J. WOOLER, Assistant Divisional Superintendent (South Division), Country Buses & Coaches, London Transport Executive, has been appointed Divisional Superintendent (North Division), Country Buses & Coaches, with the rank of Principal Executive Assistant. He succeeds MR. W. P. MORGAN, who was recently appointed Divisional Superintendent (East Division), Central Road Services.

Overseas

MR. N. S. TYABJI has been appointed Chief Engineer, Eastern Railway of India.

MR. CARLOS CID, Chief of the Cuyo District, General San Martin Railway of Argentina, has been appointed Acting Chief of the Traffic Department.

MR. R. F. MARRIOTT, Advisory Engineer, New Zealand Government Railways in London, returned to New Zealand on August 12. He has been succeeded by MR. E. M. READ.

The Chicago Transit Authority has announced the following appointments: MR. C. E. KEISER, Superintendent of Transportation, to be General Superintendent of Engineering; MR. D. M. FLYNN, Superintendent of Operations, to be Superintendent of Transportation; MR. G. KRAMBLES, Operations Planning Engineer, Staff Engineer's Office, to be Superintendent of Planning & Operations, Transportation Department; Mr. F. J. MISEK, Assistant to Operations Planning Engineer, to be Operations Planning Engineer, and MR. J. P. O'CONNOR, Senior Transit Technician, to be Assistant to Operations Planning Engineer.

MR. E. M. MACCORMICK, Agency & Charter Supervisor, Canadian Pacific Airlines, who, has been appointed Assistant Passenger Sales Manager London, Canadian Pacific Railways and not Passenger Sales Manager as recorded in our August 4 issue, joined the C.P.R. in 1956 as a Sales Representative. He has been Agency & Charter Supervisor since 1959 and in his new position he will be responsible for ocean, rail and air services.

Mr. E. M. MacCormick

Industrial

LORD WOOLTON has been elected President of the British Travel & Holidays Association.

MR. H. D. CARTER has been elected Chairman of the British Internal Combustion Engine Manufacturers' Association for the coming year. MR. C. F. BARNARD has been appointed Vice-Chairman.

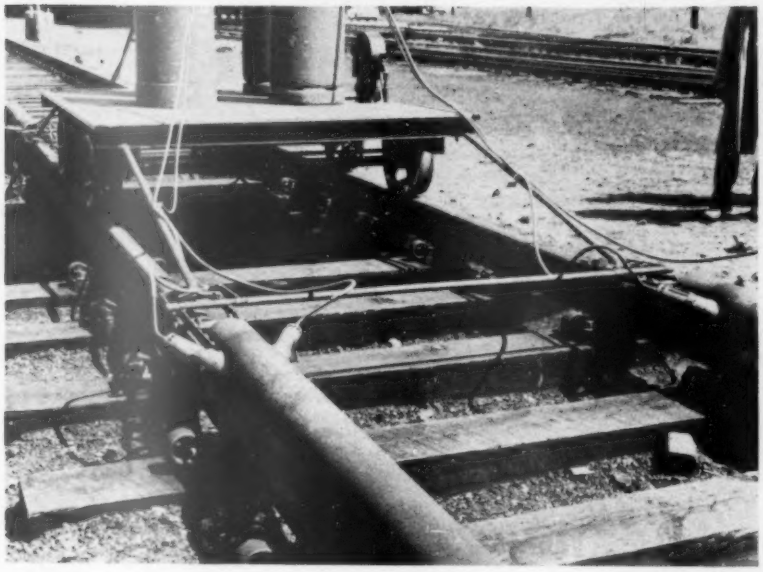
MR. N. D. MACDONALD, General Works Manager, Workington Iron & Steel Company branch of the United Steel Companies Limited has been appointed a Director of that branch.

MR. R. JONES and MR. M. ABBOTT have been appointed Assistants to the Group Sales Director, Holman Bros. Limited. MR. J. H. HOLMAN has been appointed Sales Office Manager.

MR. C. GARSTANG, General Manager, Thos. Cook & Son Ltd., returned to London on July 30, from a 31-day tour of the United States of America.

MR. W. J. FORD, Welsh Office Manager, Cardiff, Holman Bros. Limited has been appointed to the company's North Midland Office at Sheffield. He is succeeded at Cardiff by MR. A. M. GERIG.

NEW EQUIPMENT *and Processes*



RAIL DESTRESSING

Rail temperature, and not ambient temperature, is of much importance when laying long lengths of continuous-welded rail. Such temperature is measured by means of maximum and minimum thermometers fitted to a short length of rail at the side of the track at half-mile intervals.

Experience in Britain is that long-welded rails, when fastened down at the correct temperature, are able to cope with the maximum stresses of expansion and contraction, but if the fastening is done outside the temperature range of 65–80 deg. F. then buckling in summer or shifting in winter will take place. When the rail is fastened at the recommended temperatures the variations to be expected between summer and winter are not likely to exceed 40 deg. F. either way. The expansion or contraction caused by this temperature difference can be fully held by the fastenings and sleepers which are bedded deeply in ballast.

Air/propane burners

An economical and efficient method of destressing, using specially-designed air-propane burners, has been successfully adopted on the Eastern and Southern Regions of British Railways. The burners, developed by the British Oxygen Co. Ltd., at the request of British Railways, are used to warm rail to between 65 and 75 deg. F.

Of the heat sources tried out for rail destressing propane has proved by far the most successful. This is largely because of its easy handling and high vapour pressure at low temperatures.

The Eastern Region is having all its muffles, which were previously designed for benzine burners, converted to use propane. The Region will have 16 trolley sets, each set consisting of eight burners. The Southern Region has also 16 trolley sets on order which will similarly use air/propane burners. The Eastern Region will run two burners from a 100-lb. propane cylinder, the Southern Region will be working initially on the basis of one such cylinder for each burner. A factor influencing this decision is the length of time for which track possession may be obtained.

The four-wheeled trollies each carry eight air/propane burners and the necessary cylinders and regulators. Two of the burners are mounted in each of the four 9-ft. long muffles. Rollers keep these muffles clear of the rail. Destressing is carried out by moving the trolley slowly along a section of track.

Hand drive

As it is difficult to push the trolley by hand at a consistently low speed a simple hand drive is provided. A trolley warming unit will raise the temperature of 60 ft. of standard 109 lb. rail approximately 20 deg. F. in three minutes. The temperature is assessed by measuring the amount of expansion which takes place, and which is dependent on the initial temperature of the rail. When the temperature of a 500-yd. length of rail is raised from 35 deg. F. to 75 deg. F. it expands no less than 4½ in. The heating operation takes about 1¼–1½ hrs.

At the time of installation one end of the rail is fixed, the remainder of its length being supported on rollers placed between rail and baseplate at 10-yd. intervals to allow free longitudinal movement of the rail. Heating is commenced at the free end of the rail and is completed in two passes. It is necessary for the rail to be fastened down on its base plates as quickly as possible after the desired temperature has been reached.

The rail is then held rigidly in position under varying stresses of expansion or contraction, except when the rail is at a temperature of 75 deg. F. and therefore in a stable state.

Further particulars can be obtained from the manufacturers of the equipment, the British Oxygen Co. Ltd., Bridgewater House, St. James's, London, S.W.1.

TOOLING SYSTEM

The Scully-Jones system of tooling is intended to ensure maximum machine usage, with minimum time for tool changing. The system relies on time saving by quick-change tooling, preset tooling, and use of optimum machine speeds for lowest cost per unit.

The "Toolitrol" board, illustrated, houses special tool holders, in which the tools are pre-set outside the machine. Counters in the board, connected to the electrical circuit of the machine, count the cutting cycles and co-ordinate tool-change periods.

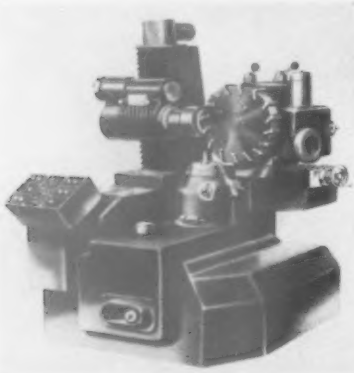
Properly used, the board will extend tool life and eliminate excessive dulling of tools.

Further details may be obtained from B. O. Morris Limited, Morrisflex Works, Briton Road, Coventry.

CUTTER-GRINDING MACHINE

An automatic face-milling cutter grinding machine has been produced for the blades of inserted-blade milling cutters.

Both carbide or high-speed steel cutters can be ground since the machine incorporates an abrasive grinding wheel and a diamond wheel mounted on individual spindles. The diamond wheel is brought into use by swivelling the grinding-wheel unit through 180 deg.



The main-cutting edge of the cutters can be joined to the dish edge by one or more chamfers, or by a radius. In the latter case the whole contour of the blade, including the radius, can be ground in a single operation.

Automatic cycles for three different methods are incorporated in the machine and are selected from a control switch mounted on the operator's push-button station. In each method the pre-set cycle of grinding repeats automatically until all blades in the cutter have been ground; after one full revolution of the cutter the machine stops automatically. No dividing plates are necessary since the blades themselves determine the required position by indexing against a flexible-steel blade rest.

The grinding spindle can be power-traversed in a vertical direction for height; in the horizontal plane movement is either by hand traverse or by power in-feed increments.

Leading particulars are: cutter dia. 3 in. to 30 in.; cup grinding wheel 6 in. dia., 2,800 r.p.m.; diamond wheel 5 in. dia., 4,400 r.p.m.; maximum stroke grinding slide 5 in.; swing of cutter head 100 deg.; main-drive motor 2 h.p.

Further details may be obtained from Kendall & Gent Limited, Victoria Works, Gorton, Manchester, 18.

CONTROL AND INDICATING
Panels

Following the successful introduction of a mosaic type of control and indicating panel for use by railway administrations, it was found that the principle of unit construction had other successful applications.

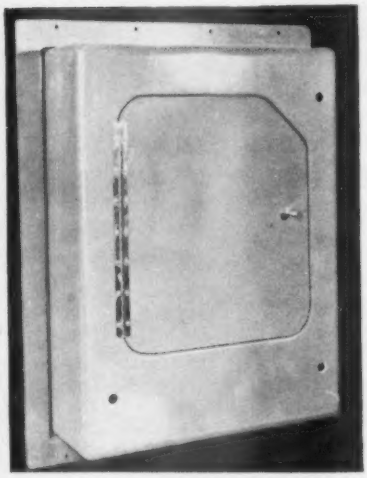
The Integra system of domino mosaic control and indication has since been applied to the central supervision of air-conditioning plant, internal and external transport installations, fire-alarm systems, large machine tools, groups of machines, and pumping stations.

The various units are mounted into control panels and enable monitoring and control instruments to be combined in a compact but clear manner. Despite the compactness the signals are brightly illuminated and reliable in long-term service. If required, modification may be carried out easily, without interfering with operation.

Further details may be obtained from Henry Williams Limited, Tolpits Lane, Watford, Herts.

REINFORCED PLASTICS

Glass-fibre reinforced plastics have provided an inexpensive solution to the problem of condensation in destination box covers. This is said to be entirely eliminated by their use; it is also claimed



that a neat design may be easily moulded in this material to any required shape, at a cost normally 25 per cent less than that of a metal box.

Further details can be obtained from the manufacturer, Vitesta Limited, Don Mill, Middleton, Manchester.

THREADING MACHINE

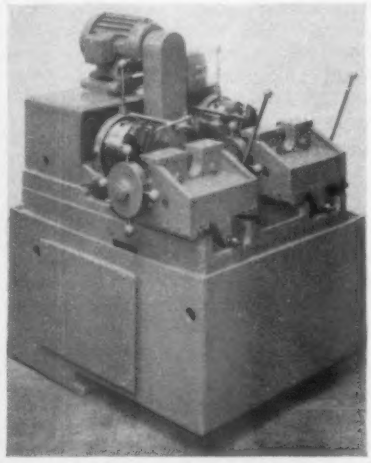
A double-spindle threading machine, capable of handling $\frac{3}{8}$ in.–$1\frac{1}{2}$ in. bolts and $\frac{1}{4}$ in.–$1\frac{1}{2}$ in. pipe, has been produced by Landis Machine-Maiden Limited.

Features of the machine are hardened and ground replaceable bed ways, and a lever-operated carriage.

The headstock is of the pick-off gear type with a choice of eight spindle speeds. Shafts are ball-bearing mounted, with bronze spindle bearings.

The carriage front, which is adjustable in the vertical and horizontal planes to ensure accuracy of alignment of the work piece to the die head, is fitted with a self-centring hammer-blow vice.

Further particulars may be obtained from the manufacturer, Landis Machine-Maiden Limited, Hyde, Cheshire.



Career with British Railways

School-leavers who have obtained their G.C.E. in four subjects at ordinary level are now being offered special starting rates on British Railways. The object of these increases is to encourage boys of a higher educational standard to join the railway salaried staffs at stations, depots, district and headquarters offices.

Three years' lead

Of the four subjects required at G.C.E. "O" level, at least two must be English and Mathematics, and with these qualifications boys of 16 may start at £330 a year (£10 more in London area). The standard rate at this age for those without the minimum passes is £230 a year, and they would not reach £330 until the age of 19. Entrants under the new scheme will, therefore, have a three years' lead on the incremental scale and will thus attain the maximum of £600 at the age of 26 instead of 29. This is in the grade known as Clerical Class 4, but there are good prospects of promotion to Class 3 at a starting salary of £635 a year before reaching the £600 maximum in the lower grade.

North Eastern Region winter timetables

The outstanding improvements in the winter timetable of the North Eastern Region of British Railways were mentioned in the editorial article in our August 4 issue.

Among other improvements in the services to be introduced on September 11 are trains from York at 7.43 a.m. and 9.16 a.m. which will arrive in London at 11.12 a.m. and 12.56 p.m. respectively. The 9.16 a.m. will provide a connection with the 8.2 a.m. from Scarborough and also the 8.20 a.m. from Harrogate.

New through services will be introduced from Halifax and Huddersfield to London by the 7.15 a.m. train from Halifax calling at Huddersfield at 7.41 a.m. and joining up at Wakefield with the 7.42 a.m. train from Leeds Central.

A number of trains between Sunderland, Newcastle, Hull, and Leeds, in both directions have been accelerated by between 3 and 23 minutes.

The through trains between Hull and Liverpool *via* Doncaster on Sundays are to be discontinued. Through trains will run between Hull and Sheffield with forward connecting services to Manchester and Liverpool. The 9.23 a.m. and 4.17 p.m trains. from Hull will arrive in Sheffield at 11.16 a.m. and 6.10 p.m. respectively, connecting services will give arrivals at Manchester at 12.51 p.m. and 7.41 p.m. and at Liverpool at 2.3 p.m. and 8.42 p.m. The 7.13 p.m. train from Hull will arrive at Sheffield at 9.40 p.m. with a connecting service to Manchester, to arrive at 11.12 p.m.

Manchester–Leeds re-timings

The 7.10 a.m., 10.40 a.m., 12.10 p.m. and 7.10 p.m. from Leeds City to Manchester, are retimed to leave at 7.22 a.m., 10.52 a.m., 12.22 p.m., and 7.22 p.m. respectively, and will arrive in Manchester one minute earlier than at present, an overall acceleration of 13 minutes. Certain trains from Manchester to Leeds will be retimed and accelerated.

The Sundays trains between Wakefield and York will leave from and arrive at Kirkgate Station instead of at Westgate as previously. Two trains from Kirkgate will leave at 7.50 a.m. and 4.8 p.m., and from York at 12.55 p.m. and 9.26 p.m.

The 11.35 a.m. train from Newcastle to Colchester will call at Sunderland, Seaham, West Hartlepool, Billingham, Stockton, and Northallerton and will convey a through coach to London, and thus an additional service to London will be provided from these stations.

The present 9.15 a.m. "North Briton" Leeds to Glasgow train will be retimed to leave Leeds City at 9.10 a.m. and will arrive Newcastle at 11.20 a.m., Edinburgh at 1.47 p.m., and Glasgow at 3.14 p.m.

The experimental sleeping-car service on the 7.5 p.m. Newcastle to Bristol and the 7.25 p.m. Bristol to Newcastle trains, Mondays to Thursdays, which began in June, is to be continued.

Certain of the little used and uneconomic services in the West Riding are to be withdrawn.

Railhead at Great Ponton for bulk cement

The Eastern Region of British Railways is conveying cement for Cement Marketing Co. Ltd. The material is to be used for the construction of the six mile-long Grantham by-pass and 20,000 tons of cement, from the Rochester area in Kent, is involved in this operation.

Choice of railhead

A suitable railhead had to be found for off-loading the cement in the Grantham area. The company undertook to supply bulk-cement wagons of its own design with air-assisted bottom-door discharge. The choice of railhead sites was limited, however, to places where there was an appreciable drop between rail level and the road, enabling lorries to be loaded by gravity.

Great Ponton, 3½ miles south of Grantham, was the nearest station capable of providing the necessary facilities. One existing siding was slewed and another regraded to provide a discharge point with a drop of 12 ft. to the road, sufficient to give a slope of 8 deg. to the air-assisted cement slide into the inlet on the top of the lorry. A temporary prefabricated cover was placed over the discharge point and the lorry loading point.

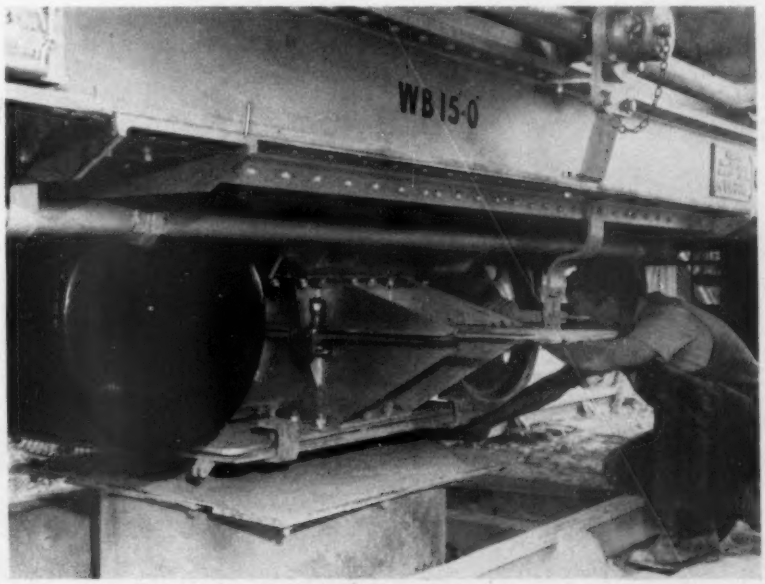
Loaded bulk wagons can now be placed on the reception siding, which had to be lifted to provide a gradient to allow them to run down to the discharge point. When they have been emptied the wagons are handled, by pinch bar, on to a parallel siding for removal.

Wagon discharge

The discharge arrangements required compressed air and Cement Marketing Co. Ltd. installed a diesel compressor on the site. It was necessary to ensure an airtight joint between the wagon-bottom outlet and the flow pipe leading to the lorry loading point. This has been achieved by using a "concertina" joint in the top of the flow pipe, which is normally just above rail level. When a loaded wagon has been placed in position, the top face of the concertina joint is forced up into contact with the unloading door by inflating a series of large inner-tubes inside the pipe. The flow pipe and unloading door are then clamped together.

A manually-operated slide valve opens the door and allows cement, assisted by air pressure, to discharge.

Regulating the flow exactly was achieved by the addition of a circular device called a Mucon valve made of fabric and using the same principle as an iris shutter. This allows the operator to regulate the flow and to shut it off instantaneously when the lorry is full. This is illustrated below. It is expected that some 600 tons of cement will be handled each week.



Positioning rail vehicle over emptying valve

Staff & Labour Matters

London Underground workshops

Following discussions at a joint working party of management and union representatives, the London Transport Executive has offered to reduce the standard working week in its railway workshops from 44 to 42 hrs.

If this offer is accepted by the executives of the unions concerned the reduced working week is likely to be introduced not later than October next.

A claim for a 40-hr. week for British Railways workshop staff was heard at the Industrial Court on August 3, and the decision of the court is awaited. The British Transport Commission had offered to consider the adoption of a 42-hr. week provided ways and means could be found to reduce its impact and keep the cost within reasonable limits. Meanwhile, discussions are proceeding at joint working party level in regard to the adoption of a 42-hr. week for British Railways Conciliation Staff.

Questions in Parliament

Westerham-Dunton Green line closure

Mr. John Rodgers (Sevenoaks—C.) asked the Minister of Transport whether he had now considered the recommendation of the Central Transport Consultative Committee that the Westerham-Dunton Green branch railway line should be retained.

Mr. Marples, in a written answer, stated that careful consideration had been given to this case but he was unable to agree with the Central Committee's conclusion that closure of this line, and adoption of the railway's alternative proposals, would cause undue social hardship. He had therefore informed the Chairman of the British Transport Commission that he was free to proceed with the closure as soon as arrangements had been made for the necessary augmentation of the bus service. This would not be before the introduction of the winter timetable on September 11 and might be later.

Monorail transport to airports

Lord Bossom asked H.M. Government, in the House of Lords on August 3, if there was any objection from the Government's point of view to monorail transport from the centre of London to any airport, provided the system was thoroughly tested and proved as to safety and speed.

In asking leave to put this question, Lord Bossom declared that he had an interest in this subject, being chairman of a group of engineers and scientists interested in this subject.

Lord Chesham, Joint Parliamentary Secretary, Ministry of Transport, replied and said that H.M. Government were prepared to consider on their merits proposals for monorail transport from the centre of London to any airport, but so far they had not received sufficient details of any scheme to make a full assessment of its potentialities. Social and financial as well as technical considerations would have to be taken into account.

Lord Waleran asked if the Ministry of Transport had sent properly qualified mechanical engineers to look over the monorail which had been running for the past eighteen months as a test line at Chateauneuf-sur-Loire.

Lord Chesham said that such engineers had been sent.

Viscount Long enquired the result of that inspection.

Lord Chesham told him that there were several monorail promoting companies which had been inspected by Mr. Hay, Parliamentary Secretary at the Ministry of Transport, among other people, as well as technical officers. Some three years ago, or rather more, around March, 1958, the Ministry issued to all the companies concerned the questions which should be answered to obtain full information in order to evaluate the schemes. Such information, had not been forthcoming.

Open day at Eastleigh

The Southern Region of British Railways held an open day at Eastleigh Works on August 9. The locomotive works at Eastleigh are the biggest on British Railways and visitors were able to see steam locomotives being overhauled, some of the latest electric locomotives, and watch electric stock being built for the recently electrified Kent Coast service. The illustration at the foot of the page shows a general view of the Eastleigh Works.

EASTLEIGH-BUILT STOCK

Adjustable seating in first-class compartment of four-car electric unit

General view of Eastleigh Works, British Railways, Southern Region, on Open Day

CONTRACTS AND TENDERS

Diesel-hydraulic locomotives for Nyasaland

W. G. Bagnall Limited has received an order from Nyasaland Railways Limited, for two diesel-hydraulic locomotives of the 0-6-0 type, 3-ft. 6-in. gauge. Powered by the Rolls-Royce C8T engine, developing 340 b.h.p., these units incorporate a Rolls-Royce 11,500 series torque-converter.

The Gloucester Railway Carriage & Wagon Co. Ltd. has received an order from the British Transport Commission for 56 bogie-gangway brake vans and 150 bulk-material wagons (Pressflow).

British Railways, Scottish Region, has placed the following contracts:—

James Kilpatrick & Son Ltd.: installation of yard lighting and electrical distribution at Millerhill Marshalling Yard;

James Anderson & King Limited: reconstruction of underbridge No. 10, on Carlisle/Glasgow trunk road;

Reliance Telephone Co. Ltd.: provision of private automatic branch exchange at Sighthill Freight Terminal;

The Scottish Construction Co. Ltd.: supply of precast concrete units for underbridge No. 113 at Hurlford;

James Sim Limited: reconstruction of overbridge No. 26, between Uddingston and Motherwell.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Argentina:

500 bogies for passenger coaches.

The tender No. is 34/61. The closing date is September 27, 1961. The Board of Trade reference is E.S.B./25545/61.

630 tons soft common-steel sheets

2,170 tons steel angles and channels.

These items are required for bridge construction. The tender No. is 41/61. The closing date is August 23, 1961. The Board of Trade reference is E.S.B./24324/61. The issuing authority for the above tenders is the Seccion Licitaciones, Empresa Ferrocarriles del Estado Argentino, Avenida Corrientes 389, Buenos Aires, to which bids should be sent.

From Australia:

6 diesel-electric locomotives.

The issuing authority is the Western Australian Government Tender Board, 74 Murray Street, Perth, W. Australia. The tender No. is 477A-1961. The closing date is September 28, 1961.

From Greece:

8,000 kg. raw linseed oil

5,000 kg. boiled linseed oil.

The issuing authority is the Hellenic State Railways (Sek), Purchasing & Stores Department, 34, Themistocleous Street, Athens, to which bids should be sent. The tender No. is 5145. The closing date is August 22, 1961. The Board of Trade reference is E.S.B./25231/61.

From India:

25,000 yd. cable VIR 7/.029.

The tender No. is Stores/Sig/ALD/61/51. The opening date is November 3, 1961.

5 oil testing sets.

The tender No. is Stores/Elec/61/ALD/102. The opening date is November 6, 1961.

15,000 yd. p.v.c.-sheathed switchboard cable, 22-conductor.

The tender No. is Stores/Sig/ALD/61/56. The opening date is November 13, 1961.

10,000 yd. p.v.c.-sheathed switchboard cable, 8-conductor.

The tender No. is Stores/Sig/ALD/61/57. The opening date is November 14, 1961.

20,000 yd. p.v.c.-sheathed switchboard cable, 12-conductor.

The tender No. is Stores/Sig./ALD/61/58. The opening date is November 15, 1961.

10 Megger earth-testers.

The tender No. is Stores/Elec/61/ALD/99. The opening date is November 22, 1961.

5 clip-on ammeters.

The tender No. is Stores/Elec/61/ALD/104. The opening date is November 23, 1961.

15 Megger insulation testers 500-V.

The tender No. is Stores/Elec/61/ALD/98. The opening date is November 24, 1961.

5 Megger insulation testers 2,500-V.

The tender No. is Stores/Elec/61/ALD/97. The opening date is November 29, 1961.

5 Megger bridges.

The tender No. is Stores/Elec/61/ALD/103. The opening date is November 30, 1961.

4 battery chargers for 24-V. 190-A. hr. batteries.

The tender No. is Stores/Elec/61/ALD/96. The opening date is December 8, 1961.

5 electric hand blowers.

The tender No. is Stores/Elec/61/ALD/100. The opening date is December 18, 1961.

5 water distilling plants.

The tender No. is Stores/Elec/61/ALD/101. The opening date is December 22, 1961.

Tender forms are available from the Deputy Controller of Stores, 232, Lower Circular Road, Calcutta. No further information is available in Export Services Branch. The Board of Trade reference is E.S.B./24995/61.

Tender for steel materials.

See Official Notices page 204 of this issue.

From The Irish Republic:

10 complete and 30 part-finished steel railway passenger coaches of an up-to-date design.

Supply of construction equipment and the giving of technical assistance to enable Coras Iompain Eireann to build coaches similar in all respects to the complete coaches supplied by the successful tenderer.

The issuing authority is the Secretary, Coras Iompair Eireann, Kingsbridge Station, Dublin 8, to whom bids should be sent. The closing date is October 18, 1961. The Board of Trade reference is E.S.B./25506/61.

From Pakistan:

6,000 cwt. creosote oil to B.S.S.144.

The tender No. is P1/GB10/73/61. The closing date is August 28, 1961. The Board of Trade reference is E.S.B./25538/61.

1 350 kW. diesel-engine driven generating set, complete with all accessories and control panel.

The tender No. is P8/HA/40/61. The closing date is September 27, 1961. The Board of Trade reference is E.S.B./25537/61. The issuing authority for the above tenders is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent.

From Portugese East Africa:

10,000 track anchors for rails of 30 kg./m.

The tender No. is 175/AB/CFM/61. The closing date is September 22, 1961. The Board of Trade reference is E.S.B /25547/61.

2,000 tarpaulins for wagons 8.60 x 4.50 m.

The tender No is 210/61. The closing date is November 3, 1961. The Board of Trade reference is E.S.B./25546/61. The issuing authority for the above tenders is The Ports, Railways & Transport Department, Lourenco Marques, to which bids should be sent.

From South Africa:

3 diesel-railcar sets.

The tender No. is B.8738. The closing date is January 26, 1962. The Board of Trade reference is E.S.B./25563/61.

30
50
70 } electric locomotives class 5E1.
100
130

The tender No. is B.8716. The closing date is November 3, 1961. The Board of Trade reference is E.S.B./25562/61.

1 electro-hydraulically operated single-purpose milling machine suitable for the milling of the butt and end faces of carriage and wagon bearing, shells, as called for in the Mechanical and Electrical Specifications.

The tender No. is G8798. The closing date is August 25, 1961. The Board of Trade reference is E.S.B./25558/61. The issuing authority for the above tenders is the Stores Department, South African Railways, and bids should be sent to the Chairman of the Tender Board, South African Railways, P O. Box 7784, Johannesburg.

From Uruguay:

20 railway wagons for cargo and livestock, for main-line service, 1,435-mm. gauge.

The issuing authority is the Administration de Ferrocarriles del Estado, to which bids should be sent. The tender No. is 63/61. The closing date is October 31, 1961. The Board of Trade reference is E.S.B./25272/61.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

NOTES AND NEWS

Presentation of Western Region road-safety trophy

Martial law on railway. After 3,000 drivers and firemen had gone on strike for higher wages the Chilean State Railways were placed under military control last week-end.

Subsidiary paint company. E. I. du Pont de Nemours & Co. Inc. has formed a wholly-owned subsidiary in Sweden to manufacture and sell paint products. The subsidiary company will be known as Du Pont de Nemours Nordiska A.B.

Thirty-first Railway Queen. Miss Susan Mary Garside, aged 14, of Southport, has been chosen as Britain's Railway Queen for 1961-62. Miss Garside's father is a Passenger Guard at Southport Chapel Street, on the London Midland Region of British Railways.

Western Region road-safety cup. Mr. J. R. Hammond, General Manager of the Western Region of British Railways, presented a cup for road safety to Mr. F. G. Dean, District Traffic Superintendent, Plymouth, on August 10. Mr. Dean accepted the cup, which was presented to the Western Region by the Society of Veteran Motorists, on behalf of the motor drivers of his district who were successful in the annual competition. In the above illustration are Mr. J. R. Hammond, Mr. F. G. Dean, Driver W. H. C. Roberts, ank Driver J. H. Renfree.

Computer symposium. An electronic data processing symposium is to be held at Olympia, London, on October 4, 5, and 6, during the Electronic Computer Exhibition which will be open from October 3-12. Speakers drawn from industry and commerce will speak under the general heading of " Earning with computers." Admission will be by ticket only, price £2 12s. 6d.

Goods depot closure. Laisterdyke Planetrees goods depot, on the North Eastern Region of British Railways, will be closed on September 11, because of the loss being incurred.

Meal charges on T.E.E. trains. The German Sleeping & Dining Car Company has changed the price of meals on T.E.E. trains in Germany, France, and the Netherlands. The new meal charges are: in Germany, breakfast 3·15 DM., small menu 7·50 DM., and large menu 8·50 DM.; in France, breakfast, 3·50 NF., small menu, 11·50 NF., and large menu 13 NF.; in the Netherlands, breakfast 2·25 Fl., small menu 6·50 Fl., and large menu 7·50 Fl. The charges for meals in the Netherlands are subject to 15 per cent service charge.

Collision at Leeds. The 2.40 p.m. seven-coach diesel train from Leeds to Scarborough collided with a diesel locomotive outside Leeds City Station on August 10 and was derailed. One person was killed and three slightly injured.

Students' competition. The North West branch of the Institute of Metal Finishing is to hold a students' competition during the 1961–62 session. The competition is open to all students, whether a member of the Institute or not, up to the age of 25 years, and will call for a paper on any subject allied to the art and science of metal finishing.

Western Region debating society. The 1961-62 session of the British Railways (Western Region) London Lecture & Debating Society will commence on October 5, with an address by Mr. J. Ratter, Member, British Transport Commission, on a subject yet to be announced.

Transport of 150-ton boiler drum. A special wagon was modified at Cowlairs Works, on the Scottish Region of British Railways, to transport a 150-ton boiler drum from Dalmuir to Newport (Mon.). The modification of the wagon undercarriage, the fitting of swivelling bolsters and the addition of a telescopic drawbar to vary the wagon length between 17 ft. and 27 ft. has converted the vehicle to carry loads of varying diameters up to 160 tons.

Schoolboys' study course. The North Eastern Region of British Railways gave a short study course to 10 grammar-school boys from August 9-16. The course, intended to interest boys in a career on British Railways, was run under the auspices of the Chief Civil Engineer.

London bus service reduction. The Central London bus service is to be reduced in October because of staff shortages. The revised schedules will effect a cut in the daily mileage of the London Transport Executive's fleet of red buses by one per cent.

KENT COAST IMPROVEMENTS

Widening between Cheriton and Folkestone Central, Southern Region

Rubble and masonry being removed after demolition of Camelon viaduct

Viaduct demolition. A 120-year old stone-arch viaduct at Camelon, near Falkirk, on the Scottish Region of British Railways was recently blown up. The viaduct would have required extensive repairs, instead the opportunity was taken to straighten the track by building an embankment and a single-span bridge to allow speeds of 100 m.p.h. The illustration shows rubble and masonry being cleared after the explosion.

Derailment at Exeter. Six vehicles were derailed after two parcel trains collided at Exeter St. Davids Station on August 13. The guard of one of the trains was slightly injured and the Down main line was blocked for nearly 12 hours.

Railway boats changed to oil fuel. The cargo boat *Slieve Bawn* is to be converted from coal to oil firing, and the officers' and crew's quarters modernised. The *Slieve Bernargh* was converted last year. Both vessels are employed on the British Railways, London Midland Region's Irish Cross Channel services.

Japanese railwaymen cleared. Seventeen trade unionists, accused of conspiracy and sabotage after a derailment at Matsukawa in which three people were killed, in 1949, were found not guilty on August 8. In 1953 four were sentenced to death and the rest to imprisonment but, in 1959, the Japanese Supreme Court ordered a retrial.

Richmond railway bridge. The railway bridge at Richmond, which takes the A307 road over the railway, is being reconstructed and is expected to be open for traffic on August 27. To coincide with the opening an experimental traffic control system through the main streets of Richmond is to be introduced.

Trains delayed by fire. A cable fire, between Hassocks and Preston Park on the Southern Region of British Railways. caused the diversion of Brighton-London trains through Lewes recently. Delays of up to 25 minutes were caused.

Westerham-Dunton Green branch to close. The Minister of Transport has rejected the recommendation by the Central Transport Consultative Committee that the Westerham-Dunton Green branch line, on the Southern Region of British Railways, remain as a social service. This is the first time that the Minister has rejected a recommendation by the C.T.C.C.

United Railways of Havana. The liquidators of the United Railways of Havana & Regla Warehouses have announced that the court has given leave for second interim distributions of 6¾ per cent of the 5 per cent Second Income Loan stock, and 1½ per cent on the Consolidated stock of the company.

Bond Street escalators. As an experiment, London Transport Executive started running both escalators at Bond Street Station upwards during the morning peak hour recently.

Eastern Region passenger count. A census is being taken of all passengers joining and leaving every train at each of 900 British Railways stations in the Eastern Region during the week commencing August 13.

International railway swimming and diving. The International railway swimming and diving championships will be held at Derby Baths, Blackpool, on October 6 and 7. Thirteen European countries will be represented.

Diesel and electric engine drivers uniform. Drivers of British Railways diesel and electric trains are to be issued with dark-green serge uniforms with two jackets, one suitable for winter wear, and the other, for summer, will be of lightweight drill in brighter green.

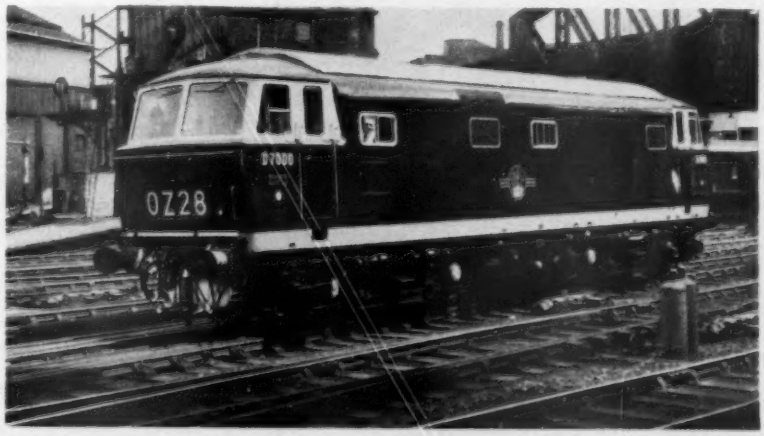
Employment on Rhodesia Railways. The removal of the racial barrier from employment on Rhodesia Railways has resulted in 22,735 applications for jobs in the 12 months ended June this year. Only about one in ten applications were received from Europeans.

Bridge demolition. The brick-arch bridge which carries the Metropolitan Line of the London Transport Executive over Rickmansworth Road, Northwood, is to be demolished and replaced under the modernisation scheme for the line. Because of the work, Rickmansworth Road was closed and traffic diverted for five days, from August 14 to 18 inclusive.

Showroom on rails. The Scottish Region travelling showroom on rails, which was specially fitted to display Scottish souvenirs, toys, fancy goods and costume jewellery, started another tour of Scotland on August 7.

Type 3 diesel-hydraulic locomotive. British Railways, Western Region, has recently taken delivery of the first of a series of 95 locomotives built by Beyer Peacock (Hymek) Limited. The locomotive illustrated below, is designed for a maximum speed of 90 m.p.h. and is powered by a Bristol Siddeley/Maybach Type MD870, 1,700-h.p. diesel engine.

Camping coach booked in U.S.A. A six-berth camping coach, at Bolton Abbey in



1,700-*h.p. diesel-hydraulic locomotive for British Railways, Western Region*

the North Eastern Region of British Railways, was booked for a holiday by an American domiciled British family at British & Irish Railway Inc. office in Los Angeles, California.

Sunday evening excursions. The North Eastern Region of British Railways began to run Sunday evening excursions between York (including Poppleton) and Harrogate (including Knaresborough) in both directions on August 6. The service will continue until and including September 10.

Type 3 locomotives on Southern Region. The illustration on this page shows a Type 3 diesel-electric locomotive of 1,550 h.p. hauling an east-bound Folkestone-Dover passenger train near Folkestone. Until the recent electrification of the London-Ashford-Folkestone main line, these mixed-traffic locomotives were often seen hauling express and semi-fast passenger trains in the South-East area of the Southern Region. They will continue to be used for freight train operation in this area. The diesel engine is a Sulzer

Diesel-electric passenger train

8LDA28; electrical equipment is by Crompton Parkinson Limited, and mechanical parts are by the Birmingham Railway Carriage & Wagon Co. Ltd.

The Trans-Zambesia Railway Co. Ltd. The Trans-Zambesia Railway Co. Ltd. has announced net receipts for 1960, £296,231 (£283,679). The balance is £145,837 (£146,775), after tax £67,825 (£75,649). Commitments are £190,000.

Motor Rail Limited. Motor Rail Limited has announced a group loss for the year to March 20, 1961, of £3,963 (loss £6,423), and no dividend (same). Current assets are £369,816 (£292,533) and liabilities £151,890 (£67,707).

Withdrawal of staff from stations. To reduce working costs on passenger train services between Sunderland and Durham, the North Eastern Region of British Railways has withdrawn certain station staff at Pallion, Cox Green, and Penshaw stations. Only staff to deal with passenger train parcels will be employed at these stations and passengers will obtain tickets from, or have their tickets collected by, the conductor-guard on the train.

Railway Stock Market

Little business was passing among foreign rails, Costa Rica ordinary stock remained at 39½, and Chilean Northern 5 per cent first debentures changed hands around 49. Guayaquil & Quito assented bonds were again quoted at 58½, Brazil Railway bonds at 3½, and Paraguay Central prior debentures were dealt in at 17½.

Improved activity in United of Havana stocks continued, but the second income stock eased from 7½ to 7, and business in the consolidated stock ranged from 1⅜ to 1½. Antofagasta stocks also received more attention on further consideration of the higher dividend. The ordinary stock after a week ago touching 23¼ (its highest for the year) eased to 22¾, and the preference stock at 36 compared with 36¼ a week ago; the 4 per cent perpetual debentures remained at 40½.

International of Central America common shares were again quoted at $17½ and the preferred stock receded from $106 to $103½. French Railway sterling bonds, however, reacted, Midi 4 per cent being 80, compared with 85 a week ago. In other directions, Mexican Central "A" bearer debentures gained a point at 59. San Paulo Railway 3s. units kept at 2s. 3d.

Canadian Pacifics came back from $46½ a week ago to $43¾; the 4 per cent preference stock gained a point at 55½, but the 4 per cent debentures eased from 53 to 52⅞. White Pass shares remained at $11¼. Nyasaland Railways shares were 10s. 6d. and the 3½ per cent debentures 32. West of India Portuguese capital stock was 117½ and Barsi Light Railway ordinary stock 17. The £1 units of second debentures of Midland Railway of Western Australia changed hands around 11s. 6d.

Among shares of locomotive building, engineering, and kindred companies, G. D. Peters remained at 18s. 9d., but Beyer Peacock 5s. shares came back from 7s. 6d. to 6s. 10½d., and Charles Roberts 5s. shares eased from 5s. 6d. to 5s. 3d. Birmingham Wagon were 21s. 3d. and North British Locomotive eased to 5s. 9d., but Wagon Repairs 5s. shares strengthened from 21s. 9d. to 22s. while Gloucester Wagon 10s. shares at 9s. 6d. were slightly firmer than a week ago.

Westinghouse Brake at 33s. 9d. compared with 34s. a week ago. Vickers came back from 35s. to 33s. 3d., T. W. Ward rallied from 70s. to 71s. 6d. and Stone-Platt gained 3s. 3d. on balance at 55s. at which there is a yield of nearly 5¾ per cent. Babcock & Wilcox lost a few pence at 27s. 7½d.

Pressed Steel 5s. shares were 21s. 3d. compared with 21s. 9d. and Dowty Group 10s. shares came back from 34s. 6d. a week ago to 32s. 6d., Ruston & Hornsby put on 1s. 3d. at 24s. 6d. at which the yield is over 7¼ per cent. In electricals, A.E.I. at 35s. 9d. declined 9d., English (31s.) were unchanged compared with a week ago, but G.E.C. lost 1s. at 29s. 9d. B.I.C.C. rallied strongly from 55s. 9d. to 58s. 4½d.

Forthcoming Meetings

August 26 (*Sat.*). The Railway Enthusiasts Club, tour of interesting lines in the London area. Open to non-members.

Sept. 2 (*Sat.*). Permanent Way Institution, London Section. Visit to Southampton Docks.

Sept. 16 (*Sat.*). The Permanent Way Institution, East Anglia Section, visit to Permali Limited, Gloucester.

Sept. 16 (*Sat.*). The South Bedfordshire Locomotive Club, special train over the freight-only, Welwyn Garden City to Hertford branch.

Sept. 21 (*Thu.*), The Model Railway Club, film show, at Keen House, Calshot Street, N.1.

Sept. 25 (*Mon.*). Institution of Railway Signal Engineers, Bristol. Signalling developments on the Railways of Southern Africa.

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Qualifications: Candidates, over 40 years of age, must be A.M.I.C.E. with at least 15 years experience on railway civil engineering projects.

Terms: Contract/gratuity for two tours of 15 to 18 months.

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SEALED Tenders will be received by the Chief Administrative Officer, Integral Coach Factory, Madras—23 for the supply of 3704 Tonnes (approximate) of steel materials such as Plates, Sheets, Flats, Rounds, etc., up to 10.30 a.m. on September 6, 1961, and opened at 11.00 a.m. on the same day. Tender Documents can be had from the Office of the undersigned up to 3 p.m. on any working day on or after the 28th of this month, on payment of Rupees ten (15s. S.D.) being the cost of the Tender Schedule either in cash or money order, which amount is not returnable. Postal Orders or remittances in any other way will not be accepted. While requisitioning for the tender schedule, reference to tender No., etc., along with the firm's full postal address, should invariably be furnished in the Money Order coupons. The Tender schedule will be available for sale up to three days prior to the opening date. Tender documents may also be obtained from the Director General, India Store Department, Govt. Buildings, Bromyard Avenue, Acton, London, W.3, and the Director, India Supply Mission, 2536 Massachusetts Avenue, N.W., Washington 8 D.C.

Dy. Controller of Stores.

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Assistant Signal Engineer

Qualifications: Candidates (Aged 30-50) should have A.M.I.R.S.E. or similar suitable qualifications.

Thorough experience of mechanical signalling and interlocking, with reasonable knowledge of power signalling and electrical interlocking. Capable of designing, estimating and controlling new works for both mechanical and electrical signalling and controlling the maintenance organisation associated with such installations.

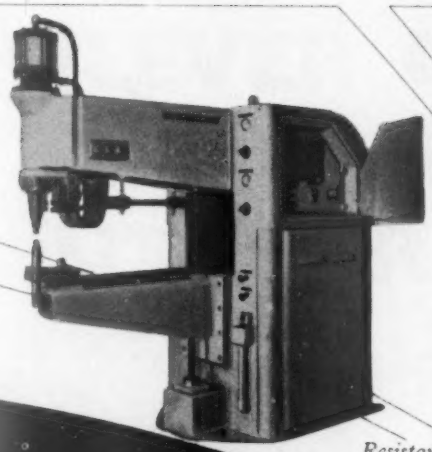
Knowledge of Centralised Traffic Control signalling system and Telegraphy and Block Systems an advantage.

Duties: Candidates will be responsible to the Signal and Telegraph Engineer, for the installation and maintenance of all signalling apparatus on the East African Railways & Harbours.

Total Emoluments (including gratuity) in scale £2,040-£3,090 p.a. Education allowances up to £200 p.a. per child. Free passages. Free medical attention.

Terms: On contract for two tours of 24 months the second tour to depend on satisfactory completion of first.

Write Director of Recruitment, Department of Technical Co-operation, Carlton House Terrace, London, S.W.1, quoting BCD173/063/D15, your full name, age and brief details of qualifications and experience.



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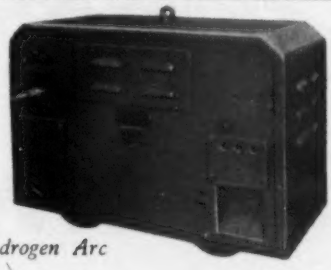

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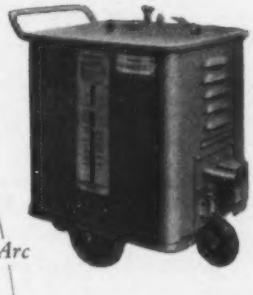

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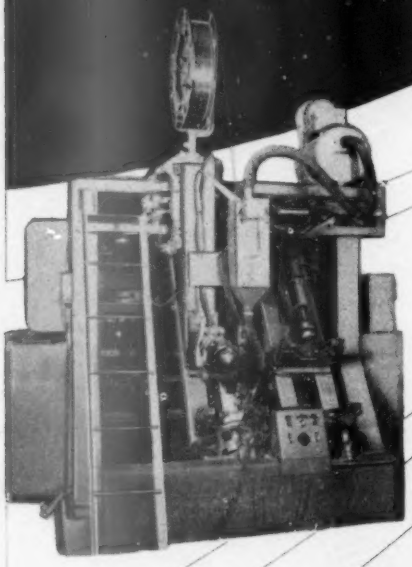

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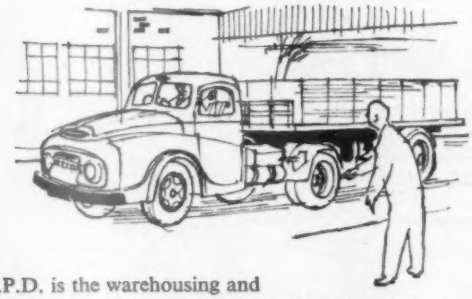

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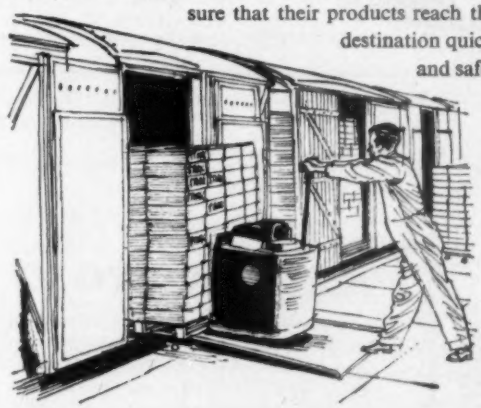

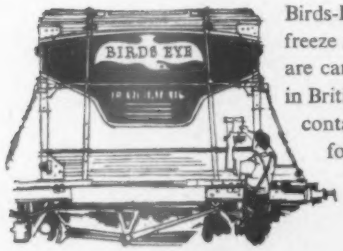

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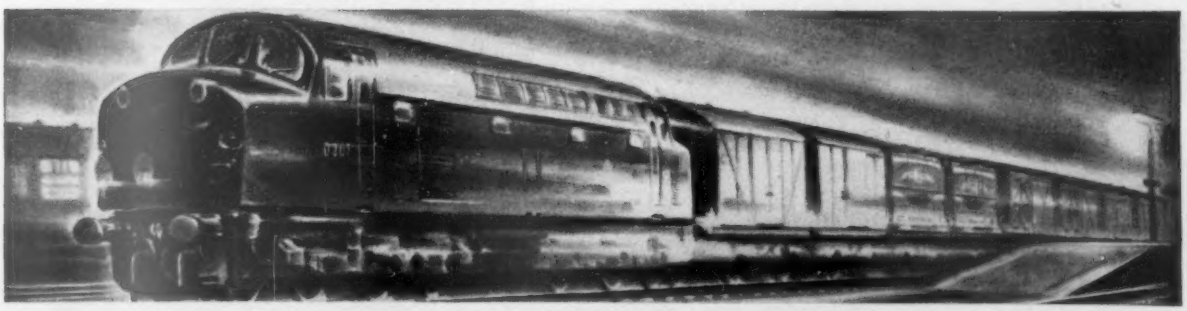

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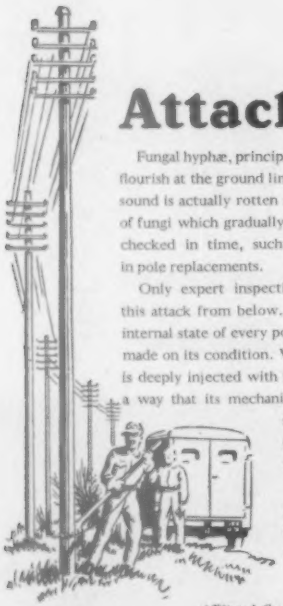

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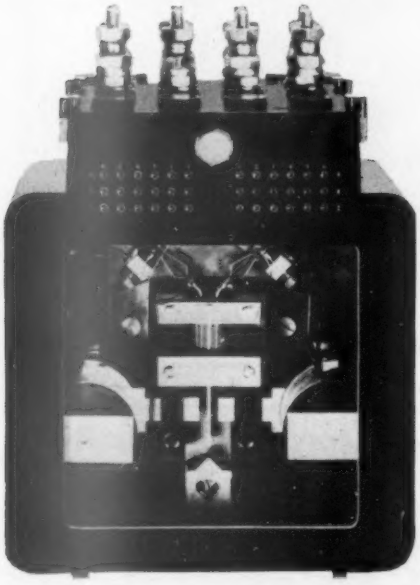

Size

With terminals fitted at top of case: W: $6\frac{5}{16}$" x H: $7\frac{1}{4}$" x D: $3\frac{5}{8}$" (Weight: $4\frac{3}{4}$ lb.).

With detachable terminal top: (Remax Limited). W: $6\frac{5}{16}$" x H: $8\frac{7}{8}$" x D: $4\frac{7}{8}$" (Weight: $5\frac{1}{4}$ lb.).

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Markings: R^1 & R^2 (Coil)
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Contact Equipment:	1F/B, 1N/R, 1N, 1R, 2N/R, 2F/B or 1F/B, 1N/R
Contact Clearance:	Minimum of .02 in.
Contact Rating:	1 ampere continuous
Contact Pressure:	N, R or F, approximately 2 grammes with current 50% in excess of P.U. value
Contact Resistance:	Max. .25 ohm, with contact carrying .1 amp D.C. and relay energised

(Biased contacts. Max: .25 ohm when relay 10% of P.U. value)

The relay can be supplied with conventional O.B.A. terminals, mounted on a moulded panel incorporated with the main 'base' of the relay unit around which the full-vision glazed cover fits.

The terminal panel includes the terminal identification symbols moulded in relief:—

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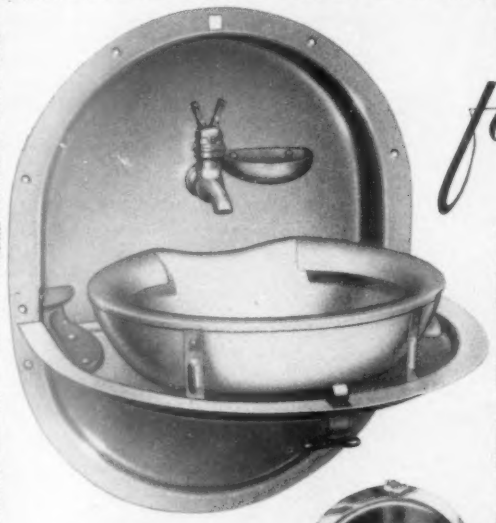

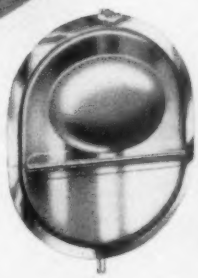

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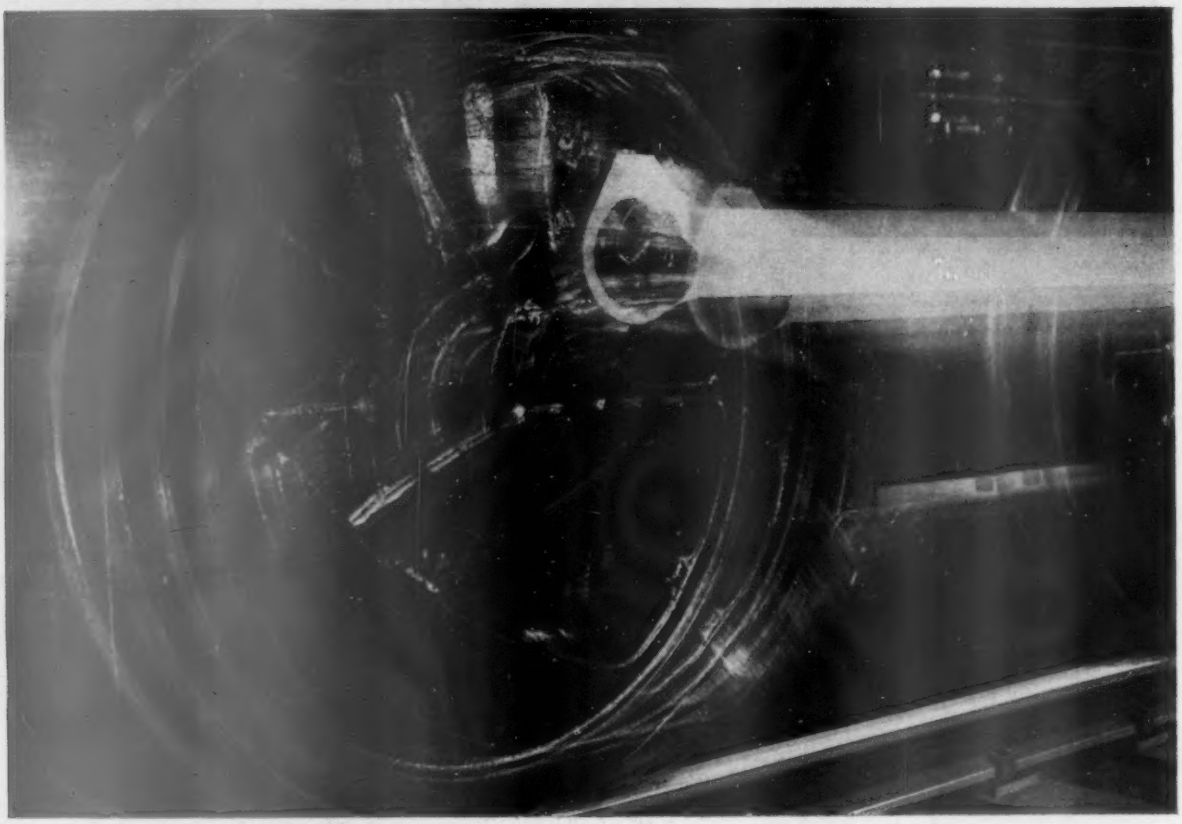

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